Physical Activity Assessment and Intervention among Adult Patients at a Community Health Center

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PHYSICAL ACTIVITY ASSESSMENT AND INTERVENTION AMONG ADULT PATIENTS AT A COMMUNITY HEALTH CENTER

Michelle Lynnea VanDenToorn

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The staff at the project site were welcoming and provided important insight into the everyday workings of the office. The clinical nurse leader, working at the project site shared her knowledge of the office and helped with the design of a project plan that would work within the office environment. The assistance of the community health worker in working with patients to find physical activity resources was much appreciated. The licensed practical nurse involved with the project, was willing to take on an extra task and was instrumental in the success of this project.
Abstract

Low levels of physical activity are associated with a number of serious health conditions in adults. These conditions include hypertension, diabetes, certain types of cancers, cardiovascular disease, and an increased risk of mortality. In spite of these serious health risks, few adults in the United States are achieving the recommended levels of physical activity. The diseases associated with low physical activity levels contribute to high healthcare costs.

Healthcare providers claim that they are not aware of available interventions and resources to increase physical activity levels in their patients. Through screening patients for physical activity levels during office visits, providers can offer interventions to patients who are not achieving recommended physical activity levels. Through providing education to staff on physical activity screening and increasing providers’ knowledge of available interventions, more patients may receive interventions related to physical activity.

Screening was performed using the General Practitioner’s Physical Activity Questionnaire (GPPAQ). The results of the questionnaire were used to help the provider to determine if the patient needed a physical activity intervention. Interventions included referral to a community health worker for help finding physical activity resources and education/counseling. The project found that PA screening could be successfully incorporated into the primary care office visit at the project site. Over 80% of eligible patients were screened. Twelve of the fifteen screened patients who were less than active received an intervention. Referral to the community health worker was not successful as many patients did not attend appointments.
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CHAPTER 1
INTRODUCTION

Physical activity (PA) is associated with a number of health benefits. These benefits include weight control, stronger bones, stronger muscles, improved mental health, fewer falls, and increased length of life. Other benefits associated with PA include a decrease in cardiovascular disease, type 2 diabetes, metabolic syndrome, and the risk of certain cancers. As PA levels increase, the benefits from PA also increase (Centers for Disease Control and Prevention [CDC], 2011c).

A systematic review and meta-analysis by Woodcock, Franco, Orsini, and Roberts (2011) analyzed the relationship between non-vigorous PA and all-cause mortality. The authors included cohort studies that totaled at least 10,000 participants. The final analysis included over 900,000 participants; approximately two-thirds of these participants were female. The authors concluded that 150 minutes of moderate PA per week reduced mortality risk by 19%, and seven hours of PA reduced the risk of mortality by 24%. Interestingly, the move from no activity to low levels of PA offered the biggest change in mortality risk. Mortality risk was found to continue to decrease as PA levels continued to rise.

Bize, Johnson, and Plotnikoff (2007) performed a systematic review and found a positive association between PA levels and health-related quality of life. Higher levels of PA are consistently associated with higher physical functioning and vitality. A review of studies published on PA in older adults by Manini and Pahor (2009) concluded that higher levels of PA will help older adults maintain physical function and independence. The authors recommend that starting PA earlier in life can lead to more functional activity for adults for longer as they grow older.
The Centers for Disease Control and Prevention (CDC, 2011b) recommends that adults perform at least 150 minutes of moderate intensity aerobic activity weekly, as well as muscle strengthening activities at least two days per week. If the intensity of exercise is increased, less time is required. According to the CDC, more PA is associated with greater health benefits.

**Magnitude of Problem**

Few adults in the United States perform the recommended amounts of PA. The 2011 Behavioral Risk Factor Surveillance System Survey found that only 51.6% of adults had met the recommended amount of aerobic activity, and only 29.3% met the recommended amount of muscle-strengthening exercise. Even fewer adults met both guidelines. Only 20.6% of adults performed both the recommended amount of aerobic activity as well as the recommended muscle-strengthening activity. In Michigan only 19.7% of adults met both recommendations for activity (CDC, 2013).

The World Health Organization (WHO, 2014) claims that lack of PA is the fourth leading cause of mortality throughout the world. Low levels of PA are estimated to be responsible for 6% of deaths globally. Physical inactivity is estimated to be the cause of 21-25% of breast and colon cancers, 27% of diabetes, and 30% of heart diseases.

PA improvement is one of the Healthy People 2020 objectives (Office of Disease Prevention and Health Promotion, 2016). The objective for PA is to improve health, fitness, and quality of life through daily PA. Increased PA has been included in the objectives, because it can increase quality of life and improve health (Office of Disease Prevention and Health Promotion, 2016).
The issue of PA improvement in adults is important to healthcare and nursing for reasons other than the concern that few people are receiving its benefits. A lack of PA increases a person’s likelihood of having a chronic disease such as diabetes, hypertension, or high cholesterol. These chronic health conditions lead to further complications such as cardiovascular disease and stroke. Chronic diseases are a substantial part of healthcare costs, incurring over 75% of healthcare costs in the United States. Chronic diseases also cause limitations in daily activities leading to a loss of manpower and increased complications. Chronic disease is also a leading cause of mortality in the United States, and was estimated to be responsible for seven in ten deaths every year (CDC, 2009).

In 2008, the CDC’s National Center for Chronic Disease Prevention and Health Promotion made the reduction of chronic diseases one of its primary goals. The agency developed a tool titled the *Framework for Preventing Chronic Disease and Promoting Health*. The framework includes three overlapping spheres: lifespan and settings, priority conditions, and underlying risk factors. Increasing PA through community based interventions fits within this goal as a means to decrease a number of the CDC’s priority conditions; one of which is obesity (CDC, 2009).

**Primary Care Provider’s Attitudes**

Primary care is where most people are seen by healthcare providers the most consistently and the most often (Josyula & Lyle, 2013a). This makes it an ideal setting for a PA intervention. However, there are a number of barriers to PA interventions in primary care. Providers claim that a lack of time and a lack of reimbursement impedes their ability to offer PA interventions (Josyula & Lyle, 2013a).
Currently, insurance companies do not pay for PA counseling and interventions when related directly to PA (Josyula & Lyle, 2013a). This makes it difficult for primary care providers who are already under time constraints to carve out space in the appointment to discuss PA with their patients, when they may not have a disease process associated with PA. However, education and behavioral counseling in primary care have been found to be cost-effective ways to increase PA. Increases in physical activity can lead to decreased cost of care due to a possible decrease in medication usage and comorbidities. PA is useful for disease and disability prevention (Josyula & Lyle, 2013a).

Other barriers that primary care providers believe hinder their ability to promote PA include a lack of knowledge regarding available resources and inadequate knowledge of specific recommendations to increase PA. Providers may also have low self-efficacy for their ability to change patients’ participation in PA. Another issue that may cause providers to not perform PA counseling and interventions can be the provider’s own failure to meet the recommended levels of PA (Josyula & Lyle, 2013a).

Providers’ inadequate knowledge of PA interventions may be related to a lack of instruction during their graduate programs about intervention methods. Grimstvedt, Ananian, Keller, Woolf, and Ainsworth (2012) performed a cross-sectional study of physician assistants’ and nurse practitioners’ perceptions regarding PA counseling. Many of the providers included in the study reported a lack of education on PA in their programs. Close to 50% of the included providers had not received regarding PA training, the health benefits of PA, or the physiology of PA.
Huijg, Crone, Verheijden, van der Zouwe, Middlekoop, and Gebhardt (2013) found that time and money are important considerations when implementing PA interventions in primary care. They surveyed experts on PA intervention regarding important factors that will likely improve the success of primary care interventions. The experts believed that these factors include intervention champions, provider knowledge of benefits of PA and PA interventions, and sustainability.

**Community Setting**

The site for the proposed project was a community health center located in the southeast quadrant of Grand Rapids, Michigan. Prior to the start of the project, the Grand Rapids estimated 2014 population was 193,792 (United States Census Bureau, 2015).

The 2013 estimated population of the neighborhood of the project site was 3,937. The largest ethnic group was African American, making up 59.3% of the neighborhood. The other two predominant ethnic groups were Caucasians (19.3%) and Hispanics (15.3%). The majority of adults living in the neighborhood were ages 45-64. The area had a 26.6% unemployment rate. An estimated 45.6% of the population lived below the poverty level. A large number of adults (23.9%) in the neighborhood did not have a high school diploma. As of 2013, 55% of the population had at most a high school diploma or GED equivalent (Community Research Institute, 2016).

The largest proportion of patients served at the health center were African Americans. Most patients received Medicaid coverage. Other means of payment included financial assistance, Medicare, or commercial insurance. There were a number of complex patients being cared for at the center. These patients were considered
complex due to having a number of health issues as well as increased psychosocial needs. Providers at the health center expressed interest in increasing PA levels of patients who received care at the project site.

The site was staffed by three licensed practical nurses, one lead registered nurse, four physicians, two nurse practitioners, and one physician assistant. Also involved in the office was one clinical nurse leader, one Michigan Primary Care Transformation Project nurse, and one community health worker. The office staff served a diverse population; they had primarily African American patients but also a growing Vietnamese and Hispanic population. The office had a high no-show rate, and because of this provided same-day appointments. The project site also served a large number of patients with uncontrolled diabetes and hypertension. Patients and providers expressed interest in PA interventions for patients.

**Physical Activity Intervention**

Exercise referral is a term describing when a healthcare provider refers a patient to a service that offers an exercise program tailored to the individual’s needs (Pavey et al., 2011). In the Grand Rapids area there were community exercise programs available through the local YMCA, through a program known as Healthy Living Hubs. Healthy Living Hubs consisted of centralized locations in the community where individuals were able to participate in PA, healthy cooking classes, and community gardens. The goal of the program was to address health disparities in high need areas (YMCA, 2016).

Similar to an exercise referral is the topic of exercise prescription. Exercise prescription is when a provider writes a prescription that tells a patient to increase his/her PA level by specific amounts. This intervention can be combined with education
and advice for patients. Exercise prescription is a specific fitness plan that is designed for a specific purpose for a specific client (Suleman & Heffner, 2016).

Both exercise referral and exercise prescription interventions have been found to be effective to increase PA. There have been a number of studies showing that exercise referral can be an effective means to increase PA levels in adult patients (Hansen, Allin, Ellis, Dodd-Reynolds, 2013; Murphy et al., 2012; Ward, Philips, Farr, & Harries, 2010; Williams, et al., 2007). Exercise prescription has also been shown to be an effective way to increase PA levels in adult patients (Horne, Skelton, Speed, & Todd, 2010; Josyula & Lyle, 2013a; Kolt et al., 2012; Petrella, Lattanzio, Shapiro, & Overend, 2010; Sorenson, Sorenson, Skovgaard, Bredahl, & Puggaard, 2010). No studies were found comparing exercise referral and exercise prescription interventions. Types of intervention that can be used are dependent on available resources. In the Grand Rapids community there were resources available for exercise referral.

Education has been found to be as effective as more expensive interventions (Orrow, Kinmonth, Sanderson, & Sutton, 2012). Offering advice and education to patients can also help to increase PA levels. Education can be delivered using motivational interviewing (Hardcastle, Blake, & Hagger, 2012).

A potential solution for low levels of PA would be to organize a readily available set of interventions from which providers and patients could choose. These interventions would include providing a PA referral and offering advice about PA to patients. These could be used together or separately.

Including PA assessment and intervention into the primary care office visit is in line with a recent call to action from the American College of Sports Medicine (ACSM).
They recently released a call to action to make PA assessment and intervention a standard of care. According to the ACSM, PA assessment should be obtained at every medical visit for every patient. This call to action was made based on evidence claiming that active lifestyles lead to healthier and longer lives. The ACSM also discussed the estimated growing number of deaths related to physical inactivity. It states that concentrated efforts from healthcare providers, government, and healthcare payers are needed (Sallis, et al., 2016).

A focus of this project was the assessment of PA for all adult patients ages 18-65 who were seen by the participating provider at the project site. PA was assessed using a standardized assessment tool, titled the General Practitioners PA Questionnaire (National Health Service [NHS], 2009). It was planned that patients with low PA levels would receive a PA intervention of counseling/education or a PA referral. The following chapters will discuss this in greater detail.
CHAPTER 2
LITERATURE REVIEW

Physical Activity, Health, and Primary Care Interventions

The focus of this literature review is to examine the evidence regarding primary care based interventions designed to increase PA among adults ages 18-65. Regular PA has a significant impact on an individual’s health. Evidence will be presented to show that there are a number of health benefits associated with increased PA levels.

In spite of the many health benefits associated with PA, many adults in the United States do not perform the recommended amount of PA. According to the CDC (2011a) recommendations, adults should perform at least 150 minutes of moderate intensity PA weekly. Muscle strengthening activities should be performed at least two days per week. As discussed in Chapter 1, according to the Behavioral Risk Factor Surveillance Survey (2011), most adults in the United States, including Michigan, fail to meet recommended PA levels.

Health benefits of PA include decreased risk of death, decreased risk of cardiovascular disease, diabetes prevention, and a lowered risk of certain types of cancer. This chapter also includes a review of interventions that have been done in primary care offices as a means to increase PA among adults. Studies that included only participants older than 65 years or younger than 18 are not included in the review. This is because children and older adults have unique needs and medical complexities in relation to PA interventions.

Databases including CINAHL, PubMed, and Google Scholar were searched. In relation to the benefits of PA the terms PA and mortality, PA and cardiovascular
disease, PA and diabetes, PA and cancer, and PA and hypertension were used. In relation to PA interventions, the terms PA and referral, exercise and referral, PA and prescription, exercise and prescription, and primary care PA interventions were used. The references of included literature were then searched for other available articles related to the topic.

**Physical Activity and Health Benefits**

**Physical Activity and Mortality**

An analysis of the Scottish Health Survey, conducted in 1995, 1998, and 2003, that included 13,221 respondents, found that individuals who perform what is described as *intense domestic PA* had a reduced risk of death compared to those who did not report intense domestic PA (Stamatakis, Hamer, & Lawlor, 2009). The 1995 survey included adults ages 35-64; the 1998 survey included adults ages 35-74; and the 2003 survey included adults over the age of 35. Fifty-eight percent of the 13,221 participants were male. The survey was conducted by interviewers during household visits. Intense domestic PA was defined as activities of daily living such as walking, climbing stairs, gardening, or intense housework. Survey information was then linked to a patient-based database of hospital episodes and deaths up to December 2007. Analysis of these combined data led the authors to believe that while intense domestic PA reduced the risk of death, it was not enough to reduce the risk of cardiovascular disease. For this, more intense PA is needed (Stamatakis et al., 2009).

A cohort study in Stockholm County, Sweden included a survey of 60-year-old individuals (Ekblom-Bak et al., 2014). The final sample included 2,023 women and 1,816 men. Participants were followed until their death or until the end of 2010. A non-
exercise PA index was established from a self-administered questionnaire. The questionnaire prompted participants to report how frequently they had performed 24 different types of activity during leisure time for the past 12 months. These activities included things such as bicycling, performing home repairs, or going hunting.

Reports of non-exercise PA were given a possible range of points from 5-15. Participants were asked about 5 different types of non-exercise PA. Items were scored one point if the individual never participated in them and three points if they regularly participated in the activity. For men, less than or equal to 10 points was considered low level non-exercise PA; 11-12 points was considered moderate level; and greater than 12 points was considered high level non-exercise PA. For women, less than or equal to 8 points was considered low level non-exercise PA; 9-10 points was considered moderate level; and greater than 10 points was considered high level non-exercise PA. The participants also underwent physical examinations and laboratory testing. Potential confounding factors such as marital status, education level, smoking status, dietary intake, general well-being, living conditions, alcohol consumption, financial status, and hereditary risk factors were included in the analysis (Ekblom-Bak et al., 2014).

The researchers found that high levels of non-exercise PA is associated with lower all-cause mortality when compared with low levels of non-exercise PA. These effects were increased when high levels of non-exercise PA were also associated with regular levels of exercise (Ekblom-Bak et al., 2014).

In the United States higher levels of PA are also associated with a reduction in mortality rates according to various studies. Data from the Harvard Alumni Health Study (HAHS) and the Women’s Health Study (WHS) were used to examine the effects of
moderate-intensity and vigorous-intensity activity on mortality rates. The HAHS followed a cohort of men who went to Harvard between 1916 and 1950 (Lee & Paffenbarger, 2000). These men completed periodic health questionnaires beginning in 1962 on health habits and medical history. The final sample of men included in the HAHS study was 7,979. The WHS was a randomized controlled trial of aspirin and vitamin E in the prevention of CVD and cancer that took place between 1992 and 2004 (Lee & Paffenbarger, 2009). The study included women over the age of 45. Women completed health questionnaires twice during the first year and then annually. The final sample size from the WHS was 36,871.

For both the HAHS and the WHS, PA was assessed using a questionnaire that queried respondents about the number of stairs climbed daily, the number of blocks walked daily, and the frequency and duration of time spent doing sports or recreational activity. This information was then assigned a metabolic equivalent (MET) score, which represents the energy cost of an activity. Moderate-intensity activities include brisk walking and casual bicycling and have a MET score of 3 to less than 6. The scores were converted to MET hours/week. The activity levels of the men and women were then put into one of five categories based on federal guidelines for PA. The categories were: (a) less than half of the recommended guidelines (0 to 3.75 MET hours/week); (b) some activity (3.75 to less than 7.5 MET hours/week); (c) satisfying the guideline (7.5 to less than 15 MET hours/week); (d) two to four times the guideline (15 to less than 30 MET hours/week); and (e) at least four times the guidelines (greater than 30 MET hours/week) (Shiroma, Sesso, Moorthy, Buring, & Lee, 2014).
In the study, mortality for men was obtained using information from the Harvard University alumni office. Mortality for women was determined from family members or postal authorities. For both men and women, medical records, death certificates, and the National Death Index were used to confirm deaths. Analyses from these data showed that for both men and women there was an inverse dose-response relationship of PA with mortality \((p < 0.001)\) (Shiroma et al., 2014). Men in the \textit{some activity} category had a 19% reduction in mortality rate when compared to the least active men; for women the reduction was 26%. Men in the \textit{most active} category had a 36% mortality rate reduction when compared to the least active men. For women there was a 55% mortality rate reduction. The results were similar when adjusted for body mass index, hypertension, and high cholesterol. This authors of this study claimed that as PA levels increase mortality rates decrease in both men and women (Shiroma et al., 2014).

The Nurses’ Health Study was a prospective cohort study, established by Dr. Frank Speizer, which began in 1976 and continued until 1996 (Nurses’ Health Study, 2016). The study included a group of female registered nurses from the ages of 30 to 55 years. The women were mailed questionnaires regarding their medical histories and lifestyles. Repeat questionnaires were mailed every two years. Final sample size for this analysis, which examined the relationship between mortality and PA, included 80,348 women. Deaths were identified by family report and the National Death Index.

PA history was obtained by asking the average number of hours spent weekly on a variety of activities. Like other studies, these authors found an inverse relationship between PA and mortality \((p < 0.0001)\). The greatest decrease in mortality risk occurred when the amount of PA increased from less than 1 hour per week to 1 to 1.9 hours per
week. This demonstrates that even small increases in PA can have an effect on mortality (Rockhill et al., 2001).

**Physical Activity and Cardiovascular Disease Risk**

Major risk factors for future cardiovascular disease include hypertension, hypercholesterolemia, low high-density lipoprotein (HDL) cholesterol, and high plasma fibrinogen (Stec et al., 2000). A study done in Sweden, including over 10,000 adults ages 18 to 70 years of age, examined these risk factors and their association with various types of PA. Types of PA included leisure time PA; perceived occupational PA; whether the individual was seated more than 50% of working hours; repetitive lifting; heavy lifting; perceived household PA; demanding household activities; and total PA. Men who participated in regular leisure time PA were less likely to have hypertension (prevalence ratio [PR] = 0.85), more likely to have higher HDL levels (PR = 0.54), and more likely to have better plasma fibrinogen levels (PR = 0.62). Women who participated in regular leisure time PA had higher levels of HDL (PR = 0.55) and plasma fibrinogen (PR = 0.53). Men who reported sitting less than 50% of the time at work had a higher HDL when compared to those who sat more than 50% of the time (PR = 0.71). The same was found to be true for women (PR = 0.68) (Fransson, Alfredsson, de Faire, Knutsson, & Westerholm, 2003).

The Ekblom-Bak et al. (2014) cohort study, described earlier, also found that high levels of non-exercise PA, such as housework and yardwork, have a beneficial effect on a number of disease markers for cardiovascular disease and diabetes. High levels of non-exercise PA were found to be associated with decreased waist circumference (odds ratio [OR] = 0.73 for women and 0.70 for men); increased HDL cholesterol (OR =
0.72 for women, 0.65 for men); and decreased triglyceride levels (OR = 0.68 for women, 0.64 for men). Men with high levels of non-exercise PA had low insulin levels (OR = 0.75), lower glucose levels (OR = 0.72), and lower fibrinogen levels (OR = 0.70). High levels of non-exercise PA, compared to low levels, were also found to decrease the risk of a fatal cardiovascular event. The authors found a significant difference in survival probability across different levels of exercise and non-exercise PA ($x^2 = 20.81$, degrees of freedom = 3, $p < 0.0001$) (Ekblom-Bak et al., 2014).

In the United States the potential for reduction in cardiovascular disease risk from PA has also been widely studied. The same study that used the HAHS and WHS to determine mortality, as described previously, also examined the relationship between PA and cardiovascular disease mortality. Men reporting some PA had a 29% to 35% rate reduction when compared to the least active men ($p = 0.02$). For women the rate reduction was between 27% and 44% ($p < 0.001$) (Shiroma et al., 2014).

The Framingham Heart Study included an examination of cardiovascular disease risk and PA (Framingham Heart Study, 2016). The Framingham Heart Study was begun in 1948 by the United States Public Health Service to study the epidemiology of cardiovascular disease. In 1949 the study was turned over to the National Heart, Lung, and Blood Institute. The study has had three cohorts: the original, the offspring, and the third generation. The study participants were originally from Framingham, Massachusetts. The third generation cohort is made up of grandchildren of the original cohort. Enrollment in the third generation cohort began in 2001 and included 4,095 adults over the age of 19 (Splansky et al., 2007).
The second examination of the third cohort included 3,411 participants; of these, 2,672 agreed to wear an accelerometer to track PA for eight days. Individuals who met PA guidelines were found to exhibit an increase in left ventricular mass ($p = 0.007$) and increased left ventricular wall thickness ($p = 0.07$). These findings indicate that PA is associated with less vascular stiffness and increased mass of the left ventricle, suggesting a relationship between PA and cardiovascular remodeling. This relationship shows that the left ventricle is less likely to become stiff or enlarged (Andersson et al., 2015).

**Physical Activity and Diabetes**

The Black Women’s Health Study (BHWS) gathered data from over 45,000 African American women, ages 21 to 69 (Boston University, 2016). The BWHS was an ongoing prospective follow-up study of African-American women that began in 1995. The study was a collaboration between Boston University and Howard University. Participants completed questionnaires every two years to gather information including incidence of disease and PA. The questionnaires asked how much PA the participant performed, as well as how much time the individual spent watching television. Greater than 5 hours per day of watching television was associated with an increased risk of type 2 diabetes (incidence rate ratio = 1.86) when compared with individuals who watched less than one hour of television per day (incidence rate ratio = 1.0). Vigorous PA was found to be associated with decreased risk of type 2 diabetes for all levels of body mass index, even those considered obese. Walking at a brisk pace was also associated with a decreased risk of type 2 diabetes (Krishnan, Rosenberg, & Palmer, 2008).
A systematic review published in 2007, included 10 prospective cohort studies and over 300,000 participants, and analyzed the association between moderate intensity PA and risk of type 2 diabetes (Jeon, Lokken, Hu, & van Dam, 2007). The review found that individuals who regularly participate in moderate intensity PA have a 30% decreased incidence of type 2 diabetes when compared to sedentary individuals. The authors also found a significant decrease in type 2 diabetes for individuals who walked regularly. Even individuals who did not lose weight through regular PA were found to have a decreased risk for type 2 diabetes (Jeon et al., 2007).

Data from the Aerobics Center Longitudinal Study, a prospective epidemiological study, was analyzed to assess the association between PA and the development of type 2 diabetes mellitus in men (Kohl et al., 1989). This analysis included over 23,000 men ages 20-85. The researchers found that any amount of PA can be protective against the development of diabetes. The men were split into three levels of PA in the analysis: sedentary; walking, jogging, running (WJR); or the fitness group. The fitness group included men involved in sports. Compared with sedentary men, those in the WJR group had a 56% reduced risk of developing diabetes and those in the fitness group had a 40% decreased risk (Sieverdes, Sui, Lee, Church, McClain, Hand, & Blair, 2010).

**Physical Activity and Cancer**

PA is considered preventative for certain types of cancer. The Japan Public Health Center-based Prospective Study began in the early 1990s and continued until 2004 (Research Center for Cancer Prevention and Screening, National Cancer Center, 2010). The study included adults between 40-69 years of age, with a final sample size
of over 95,000 participants. Regular daily PA was associated with a decreased risk of the incidence of certain cancers in both men and women. Men with the highest levels of PA had a decrease in the risk for colon cancer (hazard ratio = 0.58, p < 0.001) and pancreatic cancer (hazard ratio = 0.55, p = 0.038). Women had a decreased risk for stomach cancer (hazard ratio = 0.63, p = 0.02) (Inoue, Yamamoto, Kurahashi, Iwaki, Sasazuki, & Tsugane, 2008).

An analysis based on the American Cancer Society Cancer Prevention Study II Nutrition cohort looked at the relationship between ovarian cancer risk and PA (American Cancer Society, 2016). No significant reductions in risk for women who participated in regular PA were found. However, sedentary behavior of greater than six hours per day compared to less than three hours per day was associated with a significant increase in the risk of ovarian cancer (hazard ratio = 1.55, p = 0.01) (Patel, Rodriquez, Pavluck, Thun, & Calle, 2006).

The Nurses’ Health Study followed women for 20 years (Nurses’ Health Study, 2016). These data were analyzed to assess the association between PA and risk of cancer. In the sample of over 95,000 postmenopausal women, those who engaged in at least one hour per day of brisk walking, when compared to those who walked less than one hour per week, had a significantly decreased risk of cancer (hazard ratio = 0.91, p = 0.01). Moderate levels of PA were associated with a decreased risk of breast cancer (hazard ratio = 0.91, p = 0.009) (Eliassen, Hankinson, Rosner, Holmes, & Willett, 2010).

PA has been associated with a reduction in the risk of breast cancer in postmenopausal women, but also in premenopausal women. A population-based case-control study was performed in the Netherlands, which included subjects ages 20-54.
The study included 918 case-control subjects who had been diagnosed with invasive breast cancer between 1986 and 1989. The case-control subjects were then pair-matched by age to a control subject. PA questionnaires were performed through in-home interviews by trained interviewers. Case-control subjects had a response rate of 60% and control subjects had a response rate of 72%. The questionnaire included questions on lifetime recreational PA and job history. This information was then assigned MET scores. Women who were physically active were found to have a 30% reduction in the risk of breast cancer when compared with women who did not engage in recreational activities. Even low levels of PA were associated with a reduction in risk when compared to no PA (Verloop, Rookus, van der Kooy, & van Leeuwen, 2000).

Giovannucci, Liu, Leitzmann, Stampfer, and Willett (2005) analyzed the association between PA and the incidence and fatality of prostate cancer using data from the Health Professionals Follow-up Study, that began in 1986. The study included 51,529 male health professionals ages 40 to 75 years. The participants completed a mailed questionnaire at the initiation of the study and then completed a follow-up questionnaire every two years. The questionnaires included information on age, marital status, height and weight, ancestry, medications, smoking history, PA, diet, and new medical diagnoses. The response rate was 96%. Mortality was determined through family members, the US postal service, and the National Death Index. Responses to PA questions were then converted to MET hours per week. The researchers gained permission from participants to review medical records and pathology reports. In this prospective cohort study PA was not found to be associated with a decreased occurrence of prostate cancer. However, regular PA was found to possibly slow the
progression of prostate cancer and reduce mortality from prostate cancer (relative risk = 0.26). Men who performed regular PA were less likely to have been diagnosed with advanced cancer (relative risk = 0.33).

**Summary of Health Benefits of Physical Activity**

The health benefits of PA in adults is evident in research. PA is associated with a decreased risk of mortality (Ekblom-Bak, et al., 2014; Shiroma, et al., 2014; & Rockhill, et al., 2001). There is also an association between cardiovascular disease risk factors and increased levels of PA (Fransson et al., 2003; Ekblom-Bak et al., 2014; Shiroma et al., 2014; & Andersson et al., 2015). Diabetes risk has been shown to be decreased in individuals who are physically active (Krishnan et al., 2008; Jeon et al., 2007; & Sieverdes et al., 2010). A reduction in risk for certain types of cancer as well as a reduction in mortality from cancer has also been associated with high levels of physical activity (Inoue et al., 2008; Patel et al., 2006; Eliassen et al., 2010; Verloop et al., 2000; & Giovannucci et al., 2005).

**Physical Activity Promotion Interventions in Primary Care**

Primary care is often where individuals have the most contact with a healthcare provider. This makes primary care an ideal place for an intervention to promote PA to be implemented. A number of different types of interventions have been done in primary care in an attempt to increase PA among adults with varying levels of success.

**Physical Activity Referral**

PA referral is one method that has been used by primary care providers to try to increase PA among adults. Williams, Hendry, France, Lewis, and Wilkinson (2007) defined exercise referral “as referral by a primary care clinician to a tailored programme
of increased PA with an initial assessment, and monitoring and supervision throughout” (p.979). A variety of methods have been used in research to test referral as an intervention.

**Randomized controlled trials.** Murphy et al. (2012) performed a randomized controlled trial evaluating the effectiveness of the exercise referral scheme in Wales, United Kingdom. The study of 1,052 intervention participants and 1,052 control group participants included those who were considered to be sedentary and had coronary heart disease risk factors; anxiety, depression, or stress; or both. Participants were identified by their medical providers, who then gave trial information to patients. The provider then sent a referral form.

Study participants were mailed questionnaires which gathered information on demographic data and the General Practice Physical Activity Questionnaire (GPPAQ) (NHS, 2009). The GPPAQ defined levels of PA: *active, moderately active, moderately inactive,* or *inactive.* The control group received usual care, which included a handout that discussed the benefits of exercise and the address of local exercise facilities. The intervention group received an introduction to an exercise facility by an exercise professional. They also went through motivational interviewing and goal setting. Intervention participants were then given access to individual or group exercise classes for a fee of 1 pound. The intervention group then received telephone contact at 4 weeks, 16 weeks, 8 months, and 12 months.

Outcome measures were assessed through telephone interviews using the 7-day Physical Activity Recall (Sallis, et al., 2009). For participants unwilling to do this, the GPPAQ was used, as it was shorter. At the completion of the study PA levels were
found to be significantly higher in the coronary heart disease risk factors intervention group than in the control group. The median amount of time PA was performed by the intervention group was 210 minutes weekly, while the control group performed a median of 170 minutes weekly. A strength of this study is the large number of participants who were able to be included. A weakness is that different tools were used to assess PA pre and post intervention and because of the sample size, self-reports were the measure used to determine PA levels.

**Before and after design.** Ward, Phillips, Farr, and Harries (2010) performed a quasi-experimental “before and after” evaluation of Heartlinks, an exercise referral program. Participants were sedentary adults at risk for coronary heart disease. Participants were considered sedentary if they performed less than five 30-minute sessions of exercise weekly. Participants were either referred by their health care professional to the program, or were invited after being identified in disease registries as appropriate for the program.

Information was gathered through self-report. PA was then measured in numbers of daily sessions of 30 minutes of moderate activity or 20 minutes of vigorous activity weekly. At the beginning of the study participants received motivational interviewing and general lifestyle advice. This was repeated at 1, 3, 6, and 12 months. The participants were given a number of options for PA. These included home activity kits, guided walks, gentle exercise classes, swimming classes, and subsidized access to exercise facilities. Of the 279 participants who began the intervention, 152 dropped out. No reason was given for why participants did not remain in the study. The researchers found that subjects who participated in Heartlinks reported a significant increase in PA (t = 13.06;
Before the program, the average number of 30-minute PA sessions was 0.4. At the 12-month mark this was at 2.19 sessions. Although there were a large number of participants who did not complete the study, 46% of the participants did complete the program. Final results only included participants who completed the program. Unfortunately, the authors included no information regarding how this program compared to other exercise interventions (Ward et al., 2010).

Hansen, Allin, Ellis, and Dodd-Reynolds (2013) performed a naturalistic observational study to research the effects of a 24-week program of supervised exercise and motivational consultations on PA. The interventions were done by exercise professionals. The trans-theoretical model (Prochaska & DiClemente, 1982) was used for the consultations. Participants were referred to nine exercise facilities, between 2009 and 2010, after being referred to the program by their healthcare provider. PA was assessed using the Godin Leisure-time Exercise Questionnaire (Godin & Shephard, 1997). Participants were encouraged to participate in two supervised exercise sessions per week. These sessions were group sessions which included gym classes, circuit classes, racquet sports, and swimming.

Participants who completed the program reported a significant increase in PA (t(638) = -11.55, p < 0.001). There was a mean increase of 29 minutes/week of moderate activity. However, findings of the researchers suggest that referring someone to a program may not be enough. Over 2,000 patients were referred to the program; of these, 1,811 participants started the program. Over 1,000 participants who started the program did not complete it. Only 777 of the original patients referred completed the 24-week program. The referral program does however appear to be an effective way to
increase PA for participants. Increasing age, the female gender, and being referred for an endocrine problem were associated with increased participation in PA (Hansen et al., 2013).

Hays, Pressler, Damush, Rawl, and Clark (2010) performed a prospective design study based on social cognitive theory (Bandura, 2004) to measure exercise adoption in older low-income women at risk for cardiovascular disease. The women were offered a free daily exercise session that they were encouraged to attend at least three times per week. The researchers used social cognitive theory to assess participants’ value of exercise, measure self-efficacy and perceived health. The elements of self-efficacy, outcomes expectations, and self-definition were used in the study. The researchers found that increased self-efficacy as well as the individuals’ greater valuing of the importance of PA were related to increased exercise levels ($r = 0.14, p < 0.05; r = 0.20, p < 0.01$, respectively). Unfortunately, how the researchers measured self-efficacy is unclear from the article.

**Systematic review.** Williams et al. (2007) published a systematic review that looked at the effectiveness of exercise-referral schemes on the promotion of PA among adults. The review included 18 studies: six randomized controlled trials, one non-randomized controlled trial, four observational studies, six process evaluations, and one qualitative study. Only studies where the goal was an increase in PA were included. The authors found that exercise referral schemes can result in a significant increase in the number of sedentary adults who become moderately active. However, only one out of every 17 people referred was likely to become physically active. One of the studies included in the review included a cost analysis. The cost analysis showed that exercise
referral costs more than offering advice to patients, and is only a slightly more effective way to increase PA. Costs associated with exercise referral included cost to run the exercise program and the cost to participants. How the authors measured the cost of offering advice is not clear. Overall, the authors found that although exercise referral schemes may increase PA they may not be a cost-effective way to do so. However, this was based on the use of commercial exercise venues that have a higher cost associated with them.

**Exercise Prescription**

Exercise prescription is similar to exercise referral. In exercise prescription the healthcare provider will write a prescription instructing the patient to increase his/her PA. This is at times also accompanied by education or goal setting.

**Randomized controlled trials.** Kolt et al. (2012) performed a randomized controlled trial testing the effectiveness of a pedometer-based Green Prescription versus standard Green Prescription. Green Prescription is a program in New Zealand that involved a primary care physician prescribing PA, followed by telephone counseling where activity goals were set. During the counseling, motivational interviewing and goal-setting are used. The researchers found that the pedometer group walked significantly more than the standard group; however, both groups showed an increase in PA. The pedometer group had an average increase of 63 minutes per week, while the standard group had an average increase of 30.9 minutes per week. This suggests that the addition of a pedometer increases leisure walking. The study revealed that exercise prescription with counseling may be effective means to increase PA. A weakness of this
intervention is that it may be difficult to replicate as pedometers are easily lost and counseling sessions would be a costly intervention.

Gademan, Deutekam, Hosper, and Stranks (2012) performed a randomized controlled trial measuring levels of PA in multi-ethnic women who had been assessed to be physically inactive using a program named Exercise on Prescription. Participants were randomly assigned to the intervention group, Exercise on Prescription, or the control group, which received usual care. The intervention included 18 sessions of supervised exercise and education. The first nine sessions included education on motivation, by making participants aware of the health benefits of PA. The last nine sessions focused on empowering participants to continue PA through advice and coping skills. PA was measured using the Short Questionnaire to Assess Health Enhancing Activity (Wendel-Vos, Schuit, Saris, & Kromhout, 2003). Neither group had a significant increase in total PA when compared to baseline. However, the control group had a decrease in PA level during housework and leisure time. There was no decrease in PA level in the Exercise on Prescription group.

Petrella, Lattanzio, Shapiro, and Overend (2010) performed a randomized controlled trial comparing the effect of the Step Test Exercise Prescription (STEP) alone, and STEP with behavioral counseling on PA. The study included adults between 55 and 85 who were considered to be physically inactive and were ready to increase their PA level. PA was measured using the 7-Day Physical Activity Recall assessment tool (Sallis et al., 1985). This information was used to estimate total energy expenditure (kcal/kg/day). The researchers found that both groups reported a significant increase in PA. The STEP with behavioral counseling group’s increase in PA was significantly
higher than that of the control group (p = 0.006). The STEP with behavioral counseling group had a 2.1% increase in energy expenditure, while the control group had a 0.8% increase in energy expenditure. A strength of this study is that it compared two different interventions. The STEP alone group started with 167 participants, 160 of which completed the study. The intervention group started with 193 participants and concluded with 169 completing the intervention.

**Pre-experimental before and after design.** Sorenson, Sorenson, Skovgaard, Bredahl, and Puggaard (2010) performed a pre-experimental “before and after” designed study researching the effects of a four-month intervention, named Exercise on Prescription, on PA. The intervention included group training by an instructor as well as motivational interviewing. PA was measured using self-report questionnaires. These questionnaires focused on PA related to employment, walking, cycling, housework, and exercise. The researchers found that participants reported a significant increase in PA from baseline PA levels immediately after the intervention (p < 0.01) as well as at the 16-month assessment (p < 0.05). Weaknesses of this study included that there was no control group; in addition, many of the participants were lost to follow-up. The study began with 449 participants and ended with 152.

A study was performed in the United Kingdom looking at the influence of primary care providers on PA levels among whites and south Asians living in northwest England. The adults were ages 60-70 years old. Focus groups and interviews were conducted. The findings of the focus groups and interviews were that older adults are motivated by advice from primary care providers to increase PA as a preventive measure. The study examined the use of exercise prescriptions as well. One participant
commented that people who don’t have medical problems should still be given prescriptions in order to help prevent disease (Horne, Skelton, Speed, & Todd, 2010).

**Randomized comparison trial.** Josyula and Lyle (2013b) performed a randomized comparison trial (as there was no control group but three intervention groups) that examined the impact of healthcare providers’ prescription of PA on the level of PA. Participants in the trials were randomly assigned to three different intervention groups. The three intervention groups were: (a) written prescription; (b) written prescription plus a toolkit; and (c) written prescription and Active Living Guide. The researchers used a small sample with only 24 subjects remaining in the final sample of the 41 subjects who began the study. Only participants who returned the questionnaires were included. PA was measured using the Current Activity Status Questionnaire (Calfas, Long, Sallis, Wooten, Pratt, & Patrick, 1996). Information from questionnaires was converted into MET minutes/week to determine PA level. Those in the second group, given an exercise prescription and toolkit, reported a significant increase in PA from baseline ($p = 0.01$), whereas participants in the other two intervention groups did not. Although only one group reported a significant increase in PA, the small sample size may have affected results (Josyula & Lyle, 2013b).

**Physical Activity Education**

Another method that has been used in healthcare settings to increase PA is educational programs. Often these programs are a combination of education on PA and nutrition. Educational interventions can also include trainer led PA sessions.

**Randomized controlled trials.** Nijamkin et al. (2011) conducted a prospective randomized controlled trial comparing two groups of patients who had recently
undergone bariatric surgery. The intervention group received comprehensive nutrition
and behavior intervention sessions every other week for a total of nine sessions.
Sessions included information on meal planning, nutrition, starting an exercise program,
the importance of PA, and behavioral change strategies. The control group received
minimal education on PA levels and weight loss after gastric bypass surgery. PA was
measured using a questionnaire based on the Short Questionnaire to Assess Health
Enhancing Physical Activity (Wendel-Vos et al., 2003). The group that received more
comprehensive education reported a significant increase in the mean amount of time
spent exercising, increasing exercise time by almost 60 minutes per week (p = 0.019).
This was 14 minutes of exercise more than was performed by the control group (p <
0.001). The intensity of exercise in the intervention group was also significantly
increased (p < 0.001) (Nijamkin et al., 2011).

**Cohort study.** Jennings, Barnes, Okereke, and Welch (2013) performed a
“before and after” methodology evaluating the effectiveness of a health trainer led
intervention on weight loss and PA. Participants attended at least six 15 to 30-minute
health trainer led sessions. The time between sessions was according to the individual
needs of participants. The researchers measured PA by asking participants how many
30 minute sessions of moderate activity and how many 20 minute sessions of vigorous
exercise they completed per week. Participants reported a significant increase in
moderate activity (SD = 100, p < 0.001) as well as a significant increase in vigorous
activity (SD = 45.3, p < 0.001). The participants in this study were referred to the health
trainer if they claimed that weight loss was their primary health goal. This likely affected
results, as these participants were already motivated to make changes in their own health.

**Physical activity Counseling in Primary Care**

Jimmy and Martin (2005) performed a study in which physically inactive adults received PA counseling in the primary care setting. The transtheoretical model (Prochaska, Redding, & Evers, 2008) was used in the study. Providers discussed with participants their current stage of change: inactive with no intention of becoming active; forming the intention to become active; trying some PA; recently had become active on a regular basis; or performing regular PA for more than six months. Individuals who were already participating in regular PA were not included in the randomized controlled trial.

The eligible participants were randomized into two groups. The control group was given feedback on stage of change from healthcare providers during an appointment, received a follow-up phone call at seven weeks, and a follow-up phone call at 14 months. The intervention group received feedback on stage of change as well as a handout specific to the stage of his or her current change. The intervention group also received a recommendation from their provider to meet suggested levels of PA. Providers stated that they spent between two and ten minutes offering counseling during the appointment. Further counseling was also offered to the intervention group; this counseling was done by a PA specialist. PA was measured using a two-part frequency questionnaire. The questionnaire determined how many 20-minute sessions of vigorous PA the participant performed weekly. For both intervention groups there was a reported increase in PA, with no significant difference between those who received
further counseling and those who did not. Over half of the participants had a 150 kcal/week increased energy expenditure. Although many participants reported an increase in their PA at the 14-month follow-up, 40% of participants were still labeled as inactive (Jimmy & Martin, 2005).

Many studies on PA interventions follow patients for only a short period of time. Sanchez et al. (2014) performed a longitudinal study that collected data at six, twelve, and twenty-four months after intervention in order to assess the long-term effects of PA promotion in primary care. Over 4,000 adults ages 20-80 were eligible for the study as they did not meet the recommended levels of PA and did not have any medical conditions that excluded them from participating. Physicians provided participants with structured advice on the benefits of PA and the risks of insufficient PA. Eighty-five percent of the original participants received at least one follow-up measurement. PA was measured using the 7-Day Physical Activity Recall (Sallis et al., 1985). Individuals who were normal weight or overweight reported greater increases in PA than those who were obese. At the 24-month follow-up, 28% of participants who were insufficiently active at baseline met PA recommended levels.

**Motivational Interviewing**

Motivational interviewing has also been used as a means to promote PA among adults. Hardcastle, Blake, and Hagger (2012) conducted a study where motivational interviewing was used to promote PA among disadvantaged adults. The participants were given one-on-one sessions with a trained counselor. Self-motivation strategies were discussed and plans for change were made for those desiring this. Interestingly, the sessions did not include content concerning the reasons why increasing PA was
important. The participants could utilize up to 12 of these sessions over a six-month period. PA was measured using the International Physical Activity Questionnaire. The International Physical Activity Questionnaire PA asked questions regarding intensity, frequency, and duration of PA over the past seven days (Craig et al., 2003). Motivational interviewing was found to have a significant effect on reported PA levels. Those who attended more sessions were also more likely to report a significant increase in PA.

**Meta-analyses and Reviews of Physical Activity Interventions**

Dishman and Buckworth (1996) performed a quantitative synthesis in order to examine the efficacy of PA interventions. The synthesis included 127 studies. Studies were included if the dependent variable was a measure of PA and the independent variable was an intervention designed to increase PA. No information is given regarding the number of sessions or the length of time of the sessions. The studies assessed PA in a variety of ways including observation of attendance at activities, self-report, and exercise and strength testing. The authors reported that PA interventions are likely to improve PA levels. Interventions based on behavior modification delivered to healthy people were more likely to be effective. An emphasis on leisure PA of low intensity is also important. The synthesis did not find significant differences in effect sizes between males and females, between age groups, or between whites and non-whites.

Seo and Sa (2008) performed a meta-analysis of psycho-behavioral interventions addressing obesity among multi-ethnic and minority adults. The researchers considered the intervention to be psycho-behavioral if the intervention was not only a pharmacological intervention. This study included over 13,000 subjects. The authors
found that the more components to an intervention the more effective it is. For example, an intervention including PA, nutrition, and counseling is more effective than an intervention including only one or two of these components.

Conn, Hafdahl, and Mehr (2011) performed a meta-analysis of interventions designed to increase PA among healthy adults. This meta-analysis was quite thorough with 358 reports being analyzed. It included over 99,000 participants. PA was measured in a number of ways including self-report, objective measures, and fitness testing. The researchers found that behavioral strategies such as goal setting; self-monitoring; PA behavior feedback; consequences; exercise prescription; and cues, are more effective as a way to increase PA than cognitive strategies such as decision making, education, and providing information. They also found that interventions that are delivered face-to-face are more effective than ones that are not.

George et al. (2012) reviewed studies measuring the effectiveness of PA interventions for adult males. Only 23 studies were included in this review because males are not often the focus of PA interventions, and in most studies that are made up of both genders the percentage of male participants is smaller. PA was measured using step count, questionnaires to determine PA level, and self-report. The authors found that both face-to-face and internet based interventions can be effective ways to increase PA in males. However, it is unclear from this review if one is preferable to the other.

Orrow, Kinmonth, Sanderson, and Sutton (2012) completed a systematic review and meta-analysis of randomized controlled trials designed to promote PA in sedentary adults who were recruited in the primary care setting. The review and meta-analysis included 15 studies. From the analysis it was found that for every 12 sedentary adults
who receive an intervention, only one will meet recommended levels of PA after 12 months. It was also found that exercise referral schemes are more effective at increasing PA levels than no intervention. PA was measured using self-report measures and cardiorespiratory fitness. However, exercise referral schemes were not found to be more effective in increasing PA than face-to-face advice in the primary care setting.

Bottorff et al. (2015) performed a review of interventions for PA promotion for adult males. Any type of study design was considered for the review. Thirty-five studies were included in the literature review. Studies were excluded if data were not separated into groups of males and females, or if participants were all over the age of 65. Studies had to use an outcome measure of PA or a biomarker related to PA such as body mass index. The 35 studies included over 14,000 male participants.

Thirteen of the studies were only focused on PA; the other 22 studies included PA as well as other health behaviors, such as healthy eating. PA was measured using accelerometers, cardiorespiratory fitness, daily step count, and self-reported PA. In the review it was found that for men, engaging in group PA, such as through sports, may be a useful means of increasing PA (Bottorff, et al., 2015).

Whitt-Glover et al. (2014) reviewed PA interventions among African American adults. The authors included all types of study designs: randomized, controlled trials, single group, quasi-experimental, and non-randomized. Interventions in included studies had to have a focus on PA or physical fitness, and utilize an intervention based on behavioral science theories. At least 80% of the participants in individual studies had to be African American, or the outcomes had to be stratified by race. A total of 16 studies were included in the final literature review. PA levels in the studies were measured
using self-report, accelerometers, pedometers, questionnaires, and muscle strength. The authors found that PA interventions increase PA levels among African Americans. None of the studies found a decrease in PA after intervention. Nine of the studies that took place in a variety of settings in the community or at primary care sites resulted in a statistically significant increase in PA. Additionally, more structured programs were found to be an effective way to increase PA among African Americans.

GC, Wilson, Suhrcke, Hardeman, and Sutton (2016) completed a review that looked at the cost effectiveness of brief interventions for the promotion of PA. They defined a brief intervention as something that takes between five and thirty minutes of face-to-face time and does not necessarily include any additional paperwork. This includes things such as advice, discussion, and encouragement. Thirteen studies were included in this review. The authors found that a brief intervention can result in a meaningful increase of PA at a low cost. Pedometer use, motivational interviewing, advice, and counseling were all found to be cost-effective ways to increase PA levels for adult patients.

Conn and Coon (2016) performed an umbrella review of PA interventions among minority groups. The umbrella review is a review of other reviews. Reviews that examined PA interventions among minority groups including African Americans, Native Americans, Latino Americans, Asian Americans, Native Hawaiians, Native Alaskans, and Pacific Islanders were included. The umbrella review included 22 reviews. From the umbrella review the authors asserted that studies based on a theoretical framework were more likely to be effective than were studies that were not based on a framework. The authors interpreted findings from the umbrella review to recommend that unrealistic
demands are not placed on patients and that information on the health benefits of PA is provided to patients. They also recommend the use of community health workers and other providers who are members of the targeted minority group. Overall, the authors concluded that PA interventions can effect a modest increase in PA levels.

**Conclusion**

PA interventions based in primary care have been widely reported in literature. Exercise referral and exercise prescription have been reported to be effective ways to increase PA in sedentary adults (Gadem an et al., 2012; Josyula & Lyle, 2013b; Murphy et al., 2012; Hansen et al., 2013; Hays et al., 2010; Horne et al., 2010; Kolt et al., 2012; Petrella et al., 2010; Sorenson et al., 2010; Ward et al., 2010; Williams et al., 2007). These studies document that exercise referral and exercise prescription are effective ways to increase PA in adults of all ages and for both males and females.

Even receiving advice from a healthcare provider appears to increase PA levels (GC et al., 2016; Horne et al., 2010; Jimmy & Martin, 2005; Orrow et al., 2010; Sanchez et al., 2014). Adults who are of normal weight or overweight may be more receptive to this advice than those who are obese (Sanchez et al., 2014). Young older adults have been shown to increase PA after advice from a healthcare provider (Horne et al., 2010; Petrella et al., 2010). Assessing readiness to change before offering any type of intervention can help providers to determine the likelihood of success of the intervention (Jimmy & Martin, 2005; Petrella et al., 2010).

Increases in PA have also been found to last even after the interventions have ended. These interventions include counseling, exercise prescription, and advice offered in primary care (Gadem an et al., 2012; Jimmy and Martin, 2005; Kolt et al.,
This reveals that even a short-term intervention for people who have sedentary lifestyles could have a long-term effect on PA levels. PA interventions have been found to be effective in a variety of group settings. These include the workplace or in public community gathering places (Conn & Coon, 2016; Hays et al., 2010; Sorenson et al., 2010).

PA interventions that include education on PA and nutrition, as well as counseling have been found to be more effective than interventions with only one of these elements (Hansen et al., 2013; Nijamkin et al., 2011; Petrella et al. 2010; Seo & Sa, 2008;). Interventions that include behavioral strategies have been found to be more effective than programs that do not (Conn et al., 2011). The use of a theoretical framework has also been found to increase effectiveness of PA interventions (Conn & Coon, 2016). Support and strong self-efficacy have also been found to increase the likelihood of a person performing more PA (Hays et al., 2010).

Retention rates may be the biggest barrier to success of PA interventions. Many participants drop out of these interventions (Gademan et al., 2012; Hansen et al., 2013; Hays et al., 2010; Josyula and Lyle, 2013b; Murphy et al., 2012; Nijamkin et al., 2012; Sorenson et al., 2010; Ward et al., 2010). A common reason that participants dropped out of these studies is the time commitment required to participate in them.

A variety of interventions are available for providers who work with adults who do not meet the recommended levels of PA. No one intervention will work for every individual. The intervention should be individualized for the patient. An important area of focus should be the reasons for PA and recommendations for change. This can be done while the patient is in the office for an appointment. Jimmy and Martin (2005) reported...
that providers estimated that offering counseling during an appointment took
approximately 2-10 minutes. Referral to community PA programming will enable
participants to have a safe place to exercise in their communities and to learn PA

The use of exercise prescription, exercise referral, and advice are readily
available interventions that can be used in primary care. Although formal exercise
referral programs may not be available, community PA programs are available at little to
no cost to the participant. Providers can offer interventions to their patients based on
knowledge of the patient as well as available resources.

Many of the studies included in this chapter measured PA using questionnaires
(Gademan et al., 2012; Hansen et al., 2013; Hardcastle et al., 2012; Jimmy & Martin,
2005; Murphy et al., 2012; Njamkin et al., 2011; Petrella et al., 2010; Sanchez et al.,
2014; Sorenson et al., 2010). This shows that the use of questionnaires can be an
appropriate way to measure PA in primary care, where many of these studies were
based. Questionnaires may not provide measurement that is as accurate as
accelerometers or physiological monitors. However, they cost less and can be easily
implemented.

Interventions that used classes and education varied in the amount of time spent
during sessions and the number of sessions offered. Sessions ran from 30-90 minutes
(Gademan et al., 2012; Hansen et al., 2013; Hays et al., 2010; Njamkin et al., 2011;
Sorenson et al., 2010). The length of the interventions varied from four to six months
(Hansen et al., 2013; Sorensen et al. 2010). The frequency of the sessions also varied
from every other week, to twice a week, or three times per week (Hansen et al., 2013;
Hays et al., 2013; Nijamkin et al., 2011). There were problems with participants not completing the interventions. In some studies, only 1/3 of participants dropped out while in others there was 50% attrition (Hansen et al., 2013; Sorenson et al., 2010). Researchers from all of these studies found that individuals in the intervention group exhibited an increase in PA levels (Gademan et al., 2012; Hansen et al., 2013; Hays et al., 2010; Nijamkin et al., 2011, Sorenson et al., 2010).

The following chapters will describe the theoretical basis for the proposed PA intervention in primary care. Theories from nursing and from business will be used as a basis for this intervention. The methods of the project will also be discussed in further detail.
CHAPTER 3
CONCEPTUAL BASIS

Behavioral science predicts and explains changes in behaviors (Sutton, 2011). A behavior, such as PA, can be predicted using a model such as the Health Promotion Model (HPM). Health promotion models can help to provide the basis for interventions (Pender, Murdaugh, & Parsons, 2011). The involved provider was able to use the HPM to discuss PA with patients. There have been a number of researchers who have used the HPM as a basis for the study of PA among adults (Adams & McCrone, 2011; Costanzo & Walker, 2008; Costanzo, Walker, Yates, McCabe, & Berg, 2006). Ajzen and Fishbein’s (2005) theories of reasoned action and planned behavior can be used to change staff behavior. Along with these theories which were used as a basis for this project, the logic model was used to help guide program development (McLaughlin & Jordan, 1999). An organizational change model, such as the Burke-Litwin Model, is useful to help understand change in a specific organization (Burke & Litwin, 1992).

Health Promotion Model

The HPM provides a framework that integrates nursing and behavioral science with varying factors that influence health behaviors. The model explains the psychosocial processes that motivate individuals to engage in health promoting behaviors. Health promoting behaviors are behaviors that are engaged in for the purpose of the promotion of health and well-being, as compared to the purpose of disease avoidance. The model depicts the multidimensional nature of individuals interacting with their environments and looks at people as holistic beings (Pender, et al.,
2011). For this project the model was included in provider education as a way to discuss PA changes with patients.

The model includes a number of concepts. Main concepts of the model include: individual characteristics and experiences; behavior-specific cognitions and affect; commitment to a plan of action; immediate competing demands and preferences; and behavioral outcomes (Pender, et al., 2011). These concepts will all be examined individually.

**Individual Characteristics and Experiences**

The HPM views every person as having a unique personality and unique experiences. The uniqueness of individuals affects the actions they perform. In the HPM this includes prior-related behaviors and personal factors (Pender et al., 2011).

**Prior-related behaviors.** Prior-related behaviors refer to the performance of similar behaviors in the past, such as a history of following a healthy diet or engaging in increased PA. They are some of the best predictors of behavior. These have direct and indirect effects on the likelihood of performing health-promoting behaviors (Pender et al., 2011).

The direct effect of prior-related behaviors may be due to habit formation. When an individual repeats a behavior, habits start to form. The habit continues to strengthen each time the behavior occurs. When habits are formed and strengthened it is more likely that the behavior will continue to be performed (Pender et al., 2011).

The indirect effects of prior-related behaviors occur through the perceptions of self-efficacy, benefits, barriers, and activity-related affect. If an individual is able to achieve short-term benefits, the likelihood that a behavior will be repeated is more likely.
In order for a behavior to occur, barriers need to be overcome. Positive feedback for behavior plays an important role in activity engagement (Pender et al., 2011).

**Personal factors.** When working with health promotion, personal factors also need to be considered. Personal factors in the HPM include biologic, psychologic, and sociocultural factors. Biologic factors include age, body mass index, strength, and agility. Psychologic factors include individual self-esteem, self-motivation, and perceived health status. These psychological factors provide a place of influence that providers and staff members can use when working with patients. Providers and staff members can educate patients regarding their ability to perform actions, reasons for change, and can help patients accurately perceive their own health status. Sociocultural factors include race, ethnicity, education, and socioeconomic status. These factors need to be kept in mind when working with clients (Pender et al., 2011).

**Behavior-Specific Cognitions and Affect**

Behavior-specific cognitions and affect have major motivational significance in the HPM. These can be modified through interventions. They include perceived benefits of action, perceived barriers to action, perceived self-efficacy, activity-related affect, interpersonal influences, and situational influences (Pender et al., 2011).

**Perceived benefits of action.** Perceived benefits of action are the positive results individuals believe will occur if they engage in a behavior. These beliefs directly and indirectly motivate behavior. Beliefs determine how committed an individual is to a plan of action to engage in health-promoting behaviors. People are more likely to be committed to behaviors they perceive to have a high likelihood of positive outcomes. Perceived benefits of action include both intrinsic and extrinsic benefits. Intrinsic
benefits refer to personal benefits, such as increased alertness and energy. Extrinsic benefits are rewards that are more external, such as better social interactions or winning a medal. In relation to PA extrinsic benefits may be the ability to participate in events with friends, such as going for walks or participating in sporting events. Perceived benefits of action are necessary for the engagement in health-promoting behaviors, but by themselves are not sufficient to produce change (Pender et al., 2011).

**Perceived barriers to action.** Perceived barriers to action are an individual's perception of inconvenience, expense, difficulty, high time requirements of the proposed action, and anything else that an individual believes makes an action difficult. These are the costs that an individual associates with the proposed change in behavior. They also include loss of enjoyment when an individual engages in health-damaging behaviors. For PA this can be that time spent performing PA can take away from time spent on other activities such as reading or spending time on a computer. When barriers are thought to be high, and readiness to change is low, the likelihood that an individual will engage in the proposed health-promoting behavior is low (Pender et al., 2011).

**Perceived self-efficacy.** Perceived self-efficacy is an individual’s belief regarding his/her ability to engage in a particular action. This is the individual’s judgment of what he or she can do. When self-efficacy is high, people are more likely to engage in a behavior than if they think they are unskilled. Perceived self-efficacy influences perceptions of barriers to action. When perceived self-efficacy is high, perception of barriers is lowered (Pender et al., 2011).

**Activity-related affect.** Activity-related affect includes three components. These three components are (a) emotional arousal to the act itself, (b) the self-acting, and (c)
the environment in which the action takes place. The emotional arousal to the act itself refers to how an individual feels when thinking about the proposed action. The self-acting emotions refer to the emotions individuals feel when thinking about themselves performing the act, and how it will make them feel. The environment in which the action is to take place refers to how an individual feels in the environment. For example, performing PA in a beautiful area with sunshine and nice temperatures may be more appealing than PA in a run-down gym. How an individual feels about an action affects whether the individual will repeat the health-promoting behavior and engage in it long-term. Feelings occur before, during, and after an activity. All of these feelings affect the likelihood that an action will be repeated. When a behavior is associated with positive emotions it is more likely to be repeated (Pender et al., 2011).

**Interpersonal influences.** Interpersonal influences are the thoughts about the behaviors, beliefs, and attitudes of others. Interpersonal influences often come from family, peers, and healthcare providers. These include social norms, social support, and modeling. How important interpersonal influences are in impacting behaviors varies among people (Pender et al., 2011).

**Situational influences.** Situational influences are an individual’s thoughts about available options and aesthetic features of an environment. These influences then affect behavior. When an individual feels that an environment is safe and comfortable, the behavior is more likely to occur (Pender et al., 2011).

**Commitment to a plan**

Commitment to a plan of action is the initiation of a behavior event. This moves the individual into action as long as there are no competing demands (Pender, et al.,
According to the HPM this includes the following cognitive processes: “(1) commitment to carry out a specific action at a given time and place and with specified persons or alone, irrespective of competing preferences (implementation intention), and (2) identification of definitive strategies for eliciting, carrying out, and reinforcing the behavior” (Pender et al., 2011, p. 49). When specific strategies are determined, the likelihood that the implementation will occur successfully increases. Commitment to a plan of action without having strategies to engage in the action make failure to engage in the action more likely. Strategies that reinforce health behaviors and are individualized should be used. Specific goals can be discussed with patients to help them make plans that are tailored to their individual needs and abilities. For example, a patient with knee problems may have difficulty performing many types of PA but may be able to swim, so PA that involves swimming would be a helpful recommendation. Ensuring that it is possible for the patient to engage in the plan is important (Pender et al., 2011).

**Immediate Competing Demands and Preferences**

Immediate competing demands and preferences are other factors that compete for time and commitments. These can include work responsibilities, family responsibilities, and personal preferences. These are different from perceived barriers to action. These are the last-minute urges and demands that impede the health promoting behavior (Pender et al., 2011). For example, when driving to a gym, a competing preference would be going to a shopping mall that is on the way, instead (Pender et al., 2011).
Behavioral outcome

The end goal of the HPM is to have individuals engage in health-promoting behaviors. These are directed towards positive health outcomes. Health-promoting behaviors result in improved health, improved quality of life, and increased functional ability (Pender et al., 2011).

Interventions Based on Health Promotion

When performing an intervention that is meant to change behavior both the promotion of self-efficacy and the management of barriers to change are important to consider. Self-efficacy and barriers to change are both components of the HPM (Pender et al., 2011).

Promoting Self-Efficacy

One of the most powerful factors for the engagement in health promoting behaviors is the successful performance of a behavior. Healthcare providers should use positive feedback to encourage individuals to continue to participate in health promoting behaviors. The use of positive feedback will be included in education for this project. Persuasion and reassurance should be used to encourage behavior change (Pender et al., 2011).

Observation of others performing the intended activity can help to increase PA. When using models to increase health promotion behavior perceiving the model as similar to oneself is important. Sharing characteristics with the model enables the individual to feel that he/she will be more successful in changing his/her own behavior. These characteristics include gender, age, ethnicity, race, body mass index status, and language (Pender et al., 2011).
Albert Bandura (1977) explained how it is possible to increase self-efficacy in order to increase the desired behavior. Determining one’s self-efficacy requires consideration of abilities. Self-efficacy depends on the difficulty of the task, the amount of effort required, the amount of help received, situational influences, mood, and physical state. If people can be persuaded in their ability, that they are able to accomplish a task, they are more likely to be able to do so. Social persuasion is a means that can be used by healthcare providers to raise an individual’s belief that he or she is able to successfully perform an action (Bandura, 1977).

There are four main sources of information that impact self-efficacy. These are one’s previous accomplishments, observing others’ accomplishments, verbal persuasion, and levels of anxiety and vulnerability to stress (Bandura & Adams, 1988). Using knowledge from this theory, healthcare providers can work with their patients to increase self-efficacy levels in order to increase the likelihood that a behavior change will occur.

In order for a health promoting behavior to occur, the individual needs to have knowledge and skills to perform the behavior. The individual also needs to be able to see the benefits of the behavior change. Therefore, knowledge, skills, and perceptions of barriers can help to provide the basis for interventions based on the HPM (Pender et al., 2011).

**Managing Barriers to Change**

Barriers to change can include both internal and external barriers. Both can provide points of intervention for behavior change. Internal barriers include unclear goals, lack of skills, a perceived lack of control, and lack of motivation. Other barriers to
change can include the influence of a significant other, family, and friends. How much others can affect an individual depends on a number of factors. These factors include the importance of the person in disagreement to the individual, the extent of the disagreement, the number of people disagreeing, and how much the individual is self-directed, rather than dependent on others (Pender et al., 2011).

Barriers to change are addressed by the Centers for Disease Control and Prevention (CDC, 2011a). Barriers include a lack of time, social influence, lack of energy, lack of motivation, fear of injury, lack of skill, lack of resources, weather conditions, travel, family obligations, and retirement years. Travel can become a barrier as individuals are outside of their normal routine and may not have as many resources available for PA. For some, retirement years may be a barrier as retired individuals may feel they are unable to try new activities and may have difficulty changing behavior because of this. The CDC offers suggestions such as regularly scheduled PA, enlisting help from family and friends, planning ahead, performing low risk activities, finding convenient and inexpensive resources available in the community, developing plans that can be done regardless of weather, and including the entire family as ways to address barriers to PA.

**Interventions Based on the Health Promotion Model**

A number of PA interventions have been performed using elements of the HPM as a foundation. The elements are used as the basis for questionnaires or behavioral counseling interventions.

Costanzo and Walker (2008) performed a behavioral counseling intervention that included the core elements of self-efficacy and interpersonal support. The goal of the
intervention was to increase PA levels in older women. Self-efficacy of the participants was assessed using the Barriers to Self-Efficacy Scale (McAuley, 1992). An assessment of family and friend support was also done. During the intervention, individuals who would be supportive were identified. The women also established goals. Self-efficacy enhancement strategies were used during the intervention including increased self-awareness, verbal encouragement, and role modelling. PA was assessed using the Modified 7-day Activity Recall (Sallis et al., 1985). The study found little change in self-efficacy levels after the behavioral counseling sessions were completed. However, increases in family support were found to increase PA levels.

Costanzo, et al. (2006) performed a behavioral counseling intervention to increase PA among older women using concepts of perceived self-efficacy, perceived barriers to action, perceived benefits, and interpersonal influences. PA was assessed using the Modified 7-Day Activity Recall (Sallis et al., 1985). The participants in the study received between one and five behavioral counseling sessions. Both groups received information on the benefits of PA, safety, Healthy People 2010 goals, and were given activity logs. At this initial session the women selected their desired type of PA, identified barriers, and stated a goal. The intervention group, who received five sessions, went to 30-minute behavioral counseling sessions where activity logs were reviewed; progress toward overcoming barriers was discussed; progress on achieving goals was discussed; and new goals were identified. Those who received only one session of behavioral counseling were found to have a significant increase in moderate or greater intensity exercise. This information can be applied to a primary care visit.
Using behavioral counseling in one primary care visit can be an effective means to increase PA levels.

Adams and McCrone (2011) explored variables of the HPM to determine their effects on exercise behavior. They performed a descriptive, cross-sectional study where surveys were mailed to female employees of a large university. There was a final sample of 893 participants. The researchers looked at the effects of perceived benefits and barriers to PA on PA levels. The Exercise Benefits and Barriers Scale was used to assess perceived benefits and barriers (Sechrist, Walker, & Pender, 1987). A demographic questionnaire was used to assess the preferred method, frequency, and intensity of exercise. Participants who were already participating in PA were those who were more likely to think there were increased benefits to PA and perceive fewer barriers.

**Theories of Reasoned Action and Planned Behavior**

Ajzen and Fishbein’s theories of reasoned action and planned behavior (2005) guided efforts to change staff behavior. Reasoned action refers to the process that people use to decide what their intentions are. A person’s behaviors are related to his/her beliefs. Beliefs aren’t necessarily truthful; they can be irrational or inaccurate. Regardless of this, they form the cognitive foundation for attitudes, perceived social norms, perception of control, and intentions.

The theories of reasoned action and planned behavior have a few assumptions. Intentions occur immediately before the actual behavior. Intentions are determined by the attitude toward the behavior, subjective norm, and perceived behavioral control. Attitude toward the behavior, subjective norm, and perceived behavioral control are the
result of behavioral, normative, and control beliefs. Beliefs vary based on background factors such as prior experience and personal situations (Ajzen & Fishbein, 2005)

The theories of reasoned action and planned behavior have been combined into one model to describe how behavior occurs. The first part of the model is background factors. Background factors influence behavioral beliefs, normative beliefs, and control beliefs. Behavioral beliefs influence an individual’s attitude toward a behavior. Normative beliefs influence what an individual believes to be the subjective norm. Control beliefs influence an individual’s perceived behavioral control. Perceived behavioral control is also influenced by actual behavioral control. Attitude toward a behavior, subjective norm, and perceived behavioral control all influence intention. Intention and actual behavioral control both influence the behavior that occurs.

Background factors include the individual, social background, and available information. Individual factors include personality, mood, emotion, intelligence, values, stereotypes, general attitudes, and experience. The person’s social background includes education, age, gender, incomes, religion, race, ethnicity, and culture. Available information includes the knowledge that individuals possess, their exposure to media, and the interventions that occur (Ajzen & Fishbein, 2005).

The individuals involved in the project and their social background cannot be changed. However, the information that these individuals have available can be influenced. Support staff were given information regarding the purpose of the GPPAQ, how to use the instrument, and how to score the instrument. Providers received information regarding the HPM, how to use the HPM when working with patients when addressing PA, and the availability of a PA referral.
Logic Model

A logic model provides “a picture of how your organization does its work – the theory and assumptions underlying the program. A program logic model links outcomes (both short- and long-term) with program activities/processes and the theoretical assumptions/principles of the program” (W.K. Kellogg Foundation [WWKF], 2004, p.III). A logic model enables the user to comprehensively address improvement measurement and outcome measurement. Logic models show how a program will work under expected conditions. They include a number of elements: resources, activities, outputs, customers reached, short-term outcomes, intermediate outcomes, long-term outcomes, and external influences (McLaughlin & Jordan, 1999). Logic models provide a graphical depiction of processes. They illustrate cause-and-effect relationships by linking the problem to the intervention and to the outcomes (McCawley, n.d.).

Logic models are effective learning and management tools. They enable the user to have effective program planning, implementation, and evaluation. The model includes available resources, planned activities, and the desired results. Use of a logic model provides the stakeholders with a visual representation of the sequence of related events that connects the needs of the program with the desired results. It helps the user to develop strategy and can improve his/her ability to explain the program to stakeholders (WKKF, 2004).

Inputs are what is invested by those who are planning the program. These include human and financial resources and anything required to support the program (McLaughlin & Jordan, 1999). Inputs can include time, money, partners, equipment, and facilities (McCawley, n.d.) The W.K. Kellogg Foundation (2004) uses the terms factors
and *activities* to describe inputs. Factors are the resources and barriers that enable or limit the proposed program’s effectiveness. Activities are the processes, techniques, tools, and actions that are put into the program. These can include products; services, such as health screenings; and infrastructure. Outputs are the products or services provided to customers or participants in the program (McLaughlin & Jordan, 1999). These are the direct results of the program (WWKF, 2004).

Outcomes are the changes that occur as a result of inputs and outputs. Outcomes are specific changes in attitudes, behaviors, knowledge, skills, status, or level of functioning at an individual level (WWKF, 2004). Short-term outcomes are the changes that are most closely associated with the program outputs (McLaughlin & Jordan, 1999). Short-term outcomes occur within one to three years (WWKF, 2004). Intermediate outcomes are the changes that result from the application of short-term outcomes (McLaughlin & Jordan, 1999). Intermediate outcomes are changes in behaviors, practices, policies, and procedures (McCawley, n.d.). Long term outcomes are the benefits that happen when intermediate outcomes accumulate (McLaughlin & Jordan, 1999). Long-term outcomes are changes in the environment, social conditions, economic conditions, and political conditions (McCawley, n.d.). Long-term outcomes are the expected impact that could occur within seven to ten years. These can also be described as impacts. Impacts are the organizational, community, or system level changes (WWKF, 2004).
Using the Logic Model to Guide Physical Activity Intervention

The logic model was used to help guide a PA assessment and intervention at the project site (see Figure 1). The logic model provides a visual representation that can be read from left to right to help better understand the program.

**Inputs.** For the development of this logic model to guide a PA intervention at the project site, the inputs that impacted the success of this program needed to be considered. Inputs included the Doctor of Nursing Practice (DNP) student, staff at the site, health care providers at the site, and interest from providers in increasing PA levels among their patients. Other inputs included an interest in PA at a population health level. This is shown through the inclusion of PA in the Healthy People 2020 objectives (Office of Disease Prevention and Health Promotion, 2013). Other inputs included a community PA program and the availability of referrals to YMCA Healthy Living Hubs (YMCA, 2016).

**Outputs.** Outputs for this intervention included different activities as well as participation by a number of individuals. Activities included the determination of office flow at the project site. Staff required training on the use of the GPPAQ as a means of PA assessment. There needed to be a consistent way for providers to refer patients to community PA programming. There also needed to be standardized education for the provider to use with patients when they are not meeting PA standards. The HPM provided a basis for this education. These activities required participation from the project site staff, provider, the clinical nurse leader, and the community health worker. The DNP student was instrumental in the implementation of these activities.
Outcomes. Using the logic model was helpful in determining short, medium, and long-term outcomes of this project. Short-term outcomes included staff knowledge of the HPM, GPPAQ results, and available interventions. Awareness of interventions were knowledge of counseling using the HPM, and availability of referrals to community PA sites.

Medium-term outcomes included staff from the project site using the GPPAQ to assess PA. The results of the GPPAQ were documented in a consistent location in the electronic health record. In the electronic health record there was an available spot under Social History where PA levels could be charted. The providers used the results of the GPPAQ to provide a PA intervention by referral to community PA programs and through counseling/education. Also included in medium-term outcomes was that a high percentage of adult patients ages 18-65 are screened for PA office visits.

Long-term outcomes are larger in scale than are short- and medium-term outcomes. Long-term outcomes included an increase in PA levels among previously low active adult patients from the project site. Patients from the project site would participate in PA at community programming. More distant long-term outcomes included decreased prevalence and severity of diseases that are impacted by PA. These diseases include diabetes and hypertension.

Assumptions. Assumptions for the development of this logic model were several. The first was the assumption that staff and providers were interested in PA levels of their adult patients. The second was that there was a willingness to assess PA. The third was that the GPPAQ would not be a time consuming questionnaire for staff to use. The fourth assumption was that barriers that patients perceived regarding PA were
addressed by providers, they would have increased self-efficacy regarding their ability to perform PA. The fifth assumption was that if patients had increased self-efficacy regarding their ability to perform PA, they would increase their PA levels.

**External factors.** External factors that are outside of the control of people developing programs also have an impact on logic models. For the logic model guiding this project an external factor included the wide base of research evidence regarding the impact of PA on health. Other external factors included community interest in PA. Seeds of Promise, a community organization, had found through discussion with community members a strong interest in PA. Seeds of Promise found that community members were interested in opportunities for PA in a safe environment (personal communication, A. Sheehan, March 6, 2014). As discussed previously, there are numerous diseases impacted by PA, decreased mortality risk, and increased quality of life.

**Burke-Litwin Model**

W. Warner Burke and George Litwin created an organizational change model to help explain how an organization functions and how an organization can be deliberately changed. The Burke-Litwin model depicts 12 squares, representing important organizational variables. The vertical model includes double-sided arrows between the boxes. The arrows are double-sided because changing one variable will likely change other variables as well (Burke & Litwin, 1992).

Understanding of these variables were applied to a PA intervention at the project site. A solid understanding of the organization was important for a successful intervention, as the intervention could then be tailored to the individual organization. For
example, during the planning phase for this project there was an advanced care planning project in place at the project site. This project was initially rolled out to all staff members. However, it was found that starting this project with all providers and staff was overwhelming for the organization. This led to the project being scaled back to only include one provider and his medical assistant. This knowledge of the organization helped to guide the planning of this PA intervention.

The first variable addressed by the model is the external environment. The external environment includes the outside conditions or situations that influence the organization (Burke & Litwin, 1992). One of the biggest influences at the project site came from a local healthcare organization, which was part of a national healthcare system. The goal of the national system was to be a transforming and healing presence in the communities in which they are located. The system sought to achieve this by being committed to people-centered health care. Staff at the project site were also involved with Grand Valley State University, the two organizations worked together to improve healthcare in site and the community. Other external influences included a public health interest in PA, as has been discussed previously.

The next square presented by the Burke-Litwin Model is the mission and strategy. Mission is determined by management of the organization and strategy is how leadership intends to meet this mission (Burke & Litwin, 1992). The local healthcare organization’s mission was to be a transforming presence within the community. Also important in understanding the mission is an understanding of the vision. The organization’s vision was to offer high quality and affordable care. The project site shared this vision. Their philosophy was to provide a high standard of health care with
hospitality, respect, and compassion. The strategy behind the vision and mission of the healthcare organization was described in their guiding behaviors. These included supporting each other in serving their patients and communities, open and honest communication, being fully present, being fully accountable, trusting in the goodness of intentions, and being continuous learners.

The third box presented by the Burke-Litwin Model is leadership. This provides the overall organizational direction and behavioral role models (Burke & Litwin, 1992). The leadership team of the healthcare organization was made up of a team of medical, business, and education professionals. The office manager at the project site was a Bachelor’s prepared registered nurse. The lead physician was also involved in leadership at the project site. She was not only the lead physician of the project site, but of all four of the community benefit clinics run by the healthcare system in Grand Rapids.

The next variable is the organization’s culture. These are the overt and covert rules, values, and principles in the organization (Burke & Litwin, 1992). As discerned through discussion with the health center’s manager, it was found that the individuals who worked at the project site had a strong desire to work with the low income individuals who were served at the site. According to the manager there was a passion among those working at the health center to serve those less privileged.

The fifth square is structure. This is the arrangement of functions and people into specific areas (Burke & Litwin, 1992). This could be seen in the layout of the project site. Patient rooms were located around a centralized location where providers and medical assistants, RNs, and licensed practical nurses worked, allowing communication
to occur easily. The room where phone nurses and the clinical nurse leader were located was within a few steps of this centralized location. The opposite side of the building was where the community health worker was located. Patients could enter through a separate door from the lobby to see the community health worker. Part of structure was also the flow of patients through the office during an office visit. When patients entered the building they first checked in at the front desk. Patients were then called back into a room by a medical assistant or nurse. At this point the patient’s vitals were taken, height and weight were checked, and any necessary screenings were performed. After this was done the provider completed his/her portion of the visit. After the provider finished the visit the medical assistant or nurse re-entered the room to go over final instructions before the patient checked out at the front desk.

The next square in the Burke-Litwin Model is management practices. This is how managers use the human and material resources at their disposal to carry out the organization’s strategy (Burke & Litwin, 1992). This was seen in how the manager of the health center worked. She had a focus on teamwork and was willing to jump into different roles when able. She described herself as a “hands-on manager.” She was occasionally found helping at the front desk or with patient. Also involved in management was the lead physician. She led provider meetings where she gave all providers a chance to be included.

The seventh variable in the Burkin-Litwin Model is systems. These are the standardized policies and information systems in place (Burkin & Litwin, 1992). The project site was part of the larger health system in Grand Rapids, which was part of a national healthcare organization. Because of this affiliation any changes made at the
project site had to be in line with policies as outlined by the healthcare organization. The electronic health record that was introduced in early 2016 was AthenaHealth. AthenaHealth was a cloud-based electronic health record that was designed to focus attention back on the patients (AthenaHealth, 2016).

The next square included in the Burkin-Litwin model is climate. Climate impacts culture and is the collective impressions, expectations, and feelings that members of the organization have (Burkin & Litwin, 1992). This was seen through observing staff working in the organization. Many staff at the organization were close friends with each other. Celebrations of events in the lives of providers as well as front desk staff occurred. The change in the electronic health record revealed that some staff embraced the change while others seemed more fearful of change. However, even the staff who were not yet comfortable with the change worked hard to learn the new system. Providers seemed to be very aware of limitations that many of their patients face and tried to work with patients to ensure the plan of care was practical for them.

The ninth variable in the model is task requirements and individual skills and abilities. These are the required behaviors for task effectiveness, what people need to know in order to do their jobs effectively (Burkin & Litwin, 1992). This was seen in the degrees held by providers; who are physicians, physician assistants, and nurse practitioners. These titles illustrate the educational preparation they had undergone in order to be effective in their positions. At the project site a unique skill that many of the individuals possessed was the ability to speak Spanish as a second language. Some patients who received care at the project site could only speak Spanish. Having bilingual front desk staff, medical assistants, and providers greatly enhanced the health
center’s ability to provide care to this population. For this project providers needed to have a familiarity with the HPM. The DNP prepared family nurse practitioner (FNP) who was most involved with the project had a good understanding of the model.

The next square in the Burkin-Litwin model is individual needs and values. This box describes specific psychological factors that provide desire and worth (Burkin & Litwin, 1992). The office manager described how she was willing to work with people’s individual strengths, and enjoyed helping people work in the area that they preferred. This showed that individual needs were respected. Staff celebrating events in the lives of co-workers also helped to show that staff members were valued.

The eleventh square in the model is motivation. This refers to the behavior tendencies to move towards goals, to take needed action (Burkin & Litwin, 1992). There was work being done at the time of the project to improve blood pressure in hypertensive patients and to decrease blood sugar levels for diabetic patients. The work in progress in these areas tied in with PA interventions. The motivation to improve outcomes in these two diseases could be helped by a PA intervention. This also showed that the staff at the office were willing to work on additional projects to improve outcomes for their patients.

The final square in the Burkin-Litwin model is the outcome box. This box shows organizational performance. This is the final result of all of the other boxes (Burkin & Litwin, 1992). This can be seen through the measurement of quality indicators. The organization of the project site as described above using the Burkin-Litwin model had many strengths, including a desire to serve the community, a strong sense of teamwork,
and a variety of staff members. These strengths were helpful and increased the likelihood of the success of this project.

**Conclusion**

Pender's HPM, the theories of planned behavior and reasoned action, the Logic Model, and the Burkin-Litwin Model were all used in the planning for this project. The HPM helped to explain how health behaviors are influenced and was the basis for provider education regarding changing PA behaviors in patients. The theories of planned behavior and reasoned action guided changes in staff and provider behavior. The Logic Model provided a visual representation of the pieces that all need to come together in order to implement change. The Burkin-Litwin model helped in assessment of the organization in order to better be able to work within the organization to promote a change. The next chapter describes the methods for the PA assessment and intervention project.
**Figure 1.** Logic Model for physical activity assessment and intervention in primary care. Adapted from “Logic Model – Templates,” by University of Wisconsin-Extension-Cooperative Extension, 2009. Retrieved from [http://www.uwex.edu/ces/pdande/evaluation/evallogicmodelworksheets.html](http://www.uwex.edu/ces/pdande/evaluation/evallogicmodelworksheets.html). Copyright 1996 Board of Regents of the University of Wisconsin System
CHAPTER 4
PROJECT METHODS

The purpose of this chapter is to outline the methods that were used for the completion of this intervention. The site for this project was a primary care center which was part of a larger healthcare organization. Primary care is a natural beginning point for PA assessment and intervention. Providers in primary care often have a better understanding of the whole patient than specialist providers may, and likely interact with patients more frequently than do specialists. The General Practitioner’s Physical Activity Questionnaire (GPPAQ) (NHS, 2009) was utilized to assess PA levels of adult patients in the practice setting (see Appendix A). The GPPAQ will be discussed in further detail.

Performing a standardized PA questionnaire for adult patients is important in order to consistently assess levels of PA of patients between providers. As discussed previously, PA levels play an important role in an individual’s health. Low levels of PA are a risk factor for a number of disease processes. Even patients who appear healthy may be at risk for a number of diseases or for increased mortality because of sedentary behaviors.

PA level assessment and intervention is extremely important. Unfortunately, time is at a premium in primary care locations. However, performing a short PA assessment at non-acute office visits may be possible.

The first goal of this project was for all adult patients seen by the DNP-prepared FNP, except those in the office for an acute visit, to be screened for PA levels. This was done by having the licensed practical nurse (LPN) perform a standardized assessment of PA for all adult patients, ages 18-65. This assessment was charted in a consistent
place in the electronic health record to make the data easily available for providers. Another goal was for the DNP student to provide evidence-based interventions to the providers that are designed to increase PA among adult patients.

Project Site

The chosen site for this project was a community health center located in the southeast quadrant of Grand Rapids, Michigan. As a community health center, the organization sought to fill gaps in care by providing care to underserved members of the community. The neighborhood, where the project site was located, had a large number of people living in poverty. In 2013, an estimated 45.6% of the population lived below the poverty line. In the same year 19% of the households in the neighborhood were without a vehicle. Also in 2013, only 37.2% of the population lived in a house they owned, while 45.4% of the population were renting their living space (Community Research Institute, 2015).

The site was chosen because of interest expressed by providers and patients in addressing PA. The office employed three licensed practical nurses, one lead registered nurse, four physicians, two nurse practitioners, one physician assistant, one community health worker, one clinical nurse leader, one Michigan Primary Care Transformation Project nurse, and a number of support staff. Instrumental in this project were the medical assistants, nurses, providers, the clinical nurse leader, and the community health worker.

Targeted Population

The targeted population for this PA assessment and intervention was adult patients, ages 18-65, who came to the health center for a chronic or wellness visit. The
questionnaire, the GPPAQ, was designed for use by adults ages 16-74 years (NHS, 2009). Most of the patients served at the project site were African American (Williams, 2015). However, a growing number of Hispanic patients were coming to the health center, as well as a growing number of refugee families (R. Sanchez, personal communication, October 6, 2015). Most of the patients who received care at the project site were covered through Medicare or Medicaid as their source of health insurance (Williams, 2015). For the purpose of this intervention an English translation of the GPPAQ was used to ease implementation; however, in the future more languages could be added.

Patients at the project site had a need for a PA intervention, as was shown by elevated hemoglobin A1c (HgbA1c) levels in patients with diabetes, elevated blood pressure in patients with hypertension, and in adult patients with an elevated body mass index (BMI) who did not have an appropriate plan in place, meaning they did not have a charted intervention such as plans for diet and increased PA. Fiscal year 2015 data revealed that only 50.5% of adult patients with diabetes at the project site had a HgbA1c less than eight; yet 40.7% of adult patients with diabetes had a HgbA1c over nine. Data regarding hypertension also presented a need. In fiscal year 2015 only 51.2% of patients with hypertension had blood pressures within targeted ranges. Only 24.3% of adult patients at the project site had a high BMI charted, and an appropriate plan in place regarding weight control (personal communication, M. Williams, February 3, 2016). Reviews of charts patients with diabetes and hypertension revealed that PA level was assessed in only a few patients, and even fewer received any education or had an intervention regarding PA documented.
Stakeholders

Throughout design and implementation of the project, the DNP student functioned as the project director and met with key stakeholders to share project ideas and suggestions. Key stakeholders from the project site included the office manager, the lead physician, the DNP-prepared FNP, the clinical nurse leader, the community health worker; and the LPN.

All of these staff members had an impact on the success of this project and their opinions and recommendations were given serious consideration throughout the project. Increases in PA levels can lead to significant improvements in overall health for adults. This made the implementation of an intervention designed to increase PA levels of interest to all practitioners involved in the care of patients.

This intervention aligned well with goals of a foundation grant that had been received by the project site. The grant included goals to improve the health of the community, improve HgbA1c values, and to engage community members in improving their own health (Personal communication, T. Sanchez, October, 2, 2015). The association of PA with the diseases targeted by the grant was important, because staff could see the benefit of this project. By meeting grant goals, the likelihood of future grant funding could be improved. Increasing PA levels can affect health in a number of ways, including glycemic control, which was a focus of the grant. Through PA interventions members of the community could be engaged in the improvement of their own health.
**Barriers and Facilitators**

There are a number of factors that helped to facilitate this project, as well as obstacles that needed to be overcome in order to initiate this assessment and intervention. Facilitators included a nearby location to participate in free PA events, a community health worker, and providers interested in PA. Barriers inhibiting providers from performing education during patient appointments included limited time during patient appointments, and competing demands for attention to other client health issues.

**Facilitators**

Near the project site was a center where PA could be performed without charge. It was located in its own building less than a quarter mile from the project site. The center offered its own free exercise classes, a free exercise room with personal trainers a few mornings a week, and other classes offered for a donation. However, the center offered classes only for women. Certain classes were offered at the center through the YMCA (BE WELL Center, 2016). The community health worker was already referring patients to the center for the YMCA programming.

Other YMCA Healthy Living Hubs located near the project site could be utilized for PA opportunities. The Healthy Living Hubs were designed to reduce barriers to good health. They offered fitness classes as well as nutrition education. They were available in a number of locations in Grand Rapids at churches, schools, community centers, and community agencies. The fitness classes offered through the Healthy Living Hubs were offered free of charge. A large proportion of these hubs were located in the southeast quadrant of Grand Rapids, where the project site was located (YMCA, 2016).
The American Public Health Association (2009) defines community health workers as:

“Frontline public health workers who are trusted members of and/or have an unusually close understanding of the community served. This trusting relationship enables community health workers to serve as a liaison/link/intermediary between health/social services and the community to facilitate access to services and improve the quality and cultural competence of service delivery” (para. 1).

The presence of a community health worker provided a huge benefit to the organization for this project. She was in a unique position to help patients find community resources and as an African American was also able to understand the culture of the community. African Americans made up a large percentage of the patients served at the project site.

Providers in the office also appeared to have an interest in PA. The lead physician had a strong interest in obesity care, which ties in closely with PA. The doctoral project of the DNP-prepared FNP at the office was an implementation of PA assessment and intervention program at another office. He had continuing interest in PA and counseling clients about the health issues it addresses.

Barriers

Tai-Seale, McGuire, and Zhang (2007) performed a study looking at the length of time spent in office visits in primary care. Their study included elderly patients. The average visit length was 17.4 minutes. This time was reflective of the visit length at the project site and needed to include the physical assessment as well as a discussion of actions the client should take. The fee-for-service model utilized in the United States
required providers to see more patients in shorter time periods in order to maintain compensation levels (Linzer, Bitton, Tu, Plews-Ogan, Horowitz, & Schwartz, 2015). As payment models were moving from the fee-for-service model to a pay-for-performance model, it was expected there would likely be a greater focus on improving health outcomes. However, time was still an important factor for payment. With pay-for-performance models, reimbursement for services is based on meeting quality measures instead of the number of patients seen (National Institutes of Health, 2013).

In spite of this, time was limited during office visits. Only a certain amount of time was allocated for each patient. The DNP-prepared FNP at the project site had 30 minutes scheduled for each patient that he would see. A number of activities needed to be performed, including the clients being brought to their rooms by nursing staff or a medical assistant; having vital signs assessed; having necessary screenings performed; and then being seen by the provider. Office visit time included a discussion of discharge plans and appointment scheduling for follow-up.

Along with visit length being a barrier to the implementation of this project, competing demands among providers and staff were also barriers. In appointments with limited time available, providers were required to address a number of issues that demanded attention as higher priorities than PA counseling. Abbo, Zhang, Zelder, and Huang (2008) found that from 1997 to 2005, the average number of items addressed at every visit went from 5.4 to 7.1. Observation of patient visits at the project site revealed that a similar number of topics were addressed during patient visits. Competing demands were also present in the office as a whole.
At the project site, another DNP student project could have detracted attention from this project. That project was focused on improving discharge instructions at the end of the office visit. The lead physician was involved with that project, which could have pulled her attention from a project addressing PA. However, having only the DNP-prepared FNP involved with this pilot project lessened this concern. In order to lessen the impact of these two projects on workload of staff and providers the DNP students leading the projects collaborated with each other to ensure that the projects did not cause task duplication. This was done having joint meetings addressing the two projects, with both the office manager and clinical nurse leader. The project site had also recently undergone a change in its electronic health record. As providers adjusted to the new electronic health record it was expected they would have less time to focus on new projects as they learned to use the system and chart efficiently. This trial took place approximately six months after the change in electronic health record. Staff and providers continued to occasionally have difficulty charting quickly and efficiently. Ultimately, this did not interfered with the project.

**Measurement**

The measurement tool chosen for this project was the GPPAQ (see Appendix A). The GPPAQ was developed in 2002 by the London School of Hygiene and Tropical Medicine after it was commissioned by the Department of Health to produce a short measure of PA (NHS, 2009). The questionnaire provides a 4-level PA index (PAI). The four PAIs are (a) active, (b) moderately active, (c) moderately inactive, and (d) inactive. The GPPAQ was developed to be used to assess PA levels in adults, ages 16-74. The
authors of the GPPAQ developed the questionnaire to allow patients to complete it independently and to require less than one minute to finish it (NHS, 2009).

**European Prospective Investigation into Cancer Questionnaire**

The GPPAQ was developed using a short PA questionnaire used in the European Prospective Investigation into Cancer (NHS, 2009). The study assessed validity through comparison to resting metabolic rate ($p = 0.003$) and cardiorespiratory fitness ($p = 0.001$). Cardiorespiratory fitness and energy expenditure were determined through the use of heart rate monitors. Physical activity classification from the questionnaire was associated with daytime energy expenditure ($p < 0.001$) (Wareham, et al., 2003).

The short PA questionnaire from the European Cancer Investigation places the respondent’s activity into one of four PAI levels. The four PAI levels are the same as are seen in the GPPAQ. Four items are used in the questionnaire. The first asks about the type and amount of PA from work. The participant chooses one of four options. The options are sedentary occupation, standing occupation, physical work, or heavy manual work. The second question asks how many hours in the last week the respondent spent walking, cycling, gardening, housework, completing do-it-yourself projects, and doing other physical exercises such as swimming or running. The third question asks if the activities were vigorous enough to cause sweating or a faster heartbeat. The final question asks how many floors of stairs were climbed each day (Wareham, et al., 2003).
According to the National Health Service (2009), the London School of Hygiene and Tropical Medicine wanted to develop a questionnaire that was simple to complete, took less than one minute to complete, and provided output of the questionnaire, allowing providers to determine whether the patient needed to increase his/her physical activity. The previously developed European Prospective Investigation into Cancer questionnaire, although not developed for use in routine general practice, met many of the requirements that the developers of the GPPAQ desired. Because of this, the GPPAQ was based on the European Prospective Investigation into Cancer questionnaire (NHS, 2009).

The validity and reliability of the GPPAQ was first assessed in a pilot study with 61 patients. The providers and patients both found the questionnaire to be easy to use. A further study was done by a research fellow from the University of Warwick in which the GPPAQ was found to have good face validity and good construct validity. The study included patients from four practices; 334 participants completed the GPPAQ once, and 258 of these participants completed the GPPAQ again one week later. The second GPPAQ result was compared to an analysis of physical activity obtained from a motion sensor. The PAI obtained from the GPPAQ was found to have a close relationship with these concurrent measures (NHS, 2009).

The GPPAQ (see Appendix A) is made up of three questions. The first question asks about the amount of PA involved in the respondents’ work. The respondent is given five options and examples of careers in each option. The second question asks how often certain physical activities were done in the last week. For five different
activities, the respondent is asked to mark none; some, but less than one hour; one hour, but less than three hours; and three hours or more. The final question asks the respondents to describe their walking pace as slow, steady average, brisk, or fast (NHS 2009).

Not all of the questions included in the questionnaire are reflected in the final score. Questions regarding walking, housework, do-it-yourself projects, and gardening are not included in the final score. These items are not included because they have not been shown to give data that is sufficiently reliable to contribute to overall PA levels. However, even though these areas of the questionnaire do not contribute to the calculated result, they can contribute to meeting recommended PA levels. They have been retained because further investigation may show that an individual who spends time in these areas is meeting recommended PA levels (NHS, 2009).

The responses to the questions about activities, frequency of performing activities, and speed of activity are then used to determine the respondents' PAI. The four PAI categories include inactive, moderately inactive, moderately active, or active (NHS, 2009).

**Expert Recommendations for Physical Activity Measurement**

The American College of Sports Medicine (ACSM) and the American Heart Association (AHA) have given recommendations for the measurement of PA in primary care. The AHA guidelines for recommended levels of PA have previously been discussed. The ACSM recommendations are similar to those of the AHA. The ACSM recommends that adults perform moderate-intensity cardiorespiratory exercise training for 30 minutes or longer per day for five or more days per week; vigorous intensity
cardiorespiratory exercise training for greater than or equal to 20 minutes, for three or more days per week; or a combination of intensities of PA. These activities should use all of the large muscle groups as occurs in walking, hiking, jogging, or swimming. Even when these levels of PA are not met, the ACSM states that health outcomes can still be improved (Garber et al., 2011).

**ACSM Recommendations.** The ACSM, with involvement from the American Medical Association, manages a global health initiative named *Exercise is Medicine.* The goal of the initiative is to make counseling regarding the scientifically proven benefits of PA the standard of care in the healthcare system in the United States and throughout the world. The vision of *Exercise is Medicine* is for providers to assess PA of patients at every office visit, to determine whether the patient is meeting PA guidelines, and to provide the patient with counseling to help him/her meet guidelines, and/or to refer to community resources (ACSM, 2016).

According to the *Exercise is Medicine* initiative, a discussion of PA levels may be the greatest influence on a patient’s decision to engage in PA. The ACSM recommends the use of a simple and rapid tool such as the Physical Activity Vital Sign (PAVS). The PAVS tool consists of two questions, “1. How many days during the past week have you performed physical activity where your heart beats faster and your breathing is harder than normal for 30 minutes or more? 2. How many days in a typical week do you perform activity such as this?” (Greenwood, Joy, & Stanford, 2010, p. 572).

The use of a questionnaire can help to provide a snapshot of PA level and also helps to track changes in PA level (ACSM, n.d.). The GPPAQ provides more detail than does the PAVS and asks questions that would also help to determine the amount of
time that an individual is performing PA, weekly. Because of further recommendations by the AHA regarding the importance of questions including the domains and dimensions of physical activity, the GPPAQ was chosen rather than the PAVS for this project.

**AHA Recommendations.** The AHA describes two types of PA. These include structured and incidental PA. Structured PA is planned, purposeful activity that is done to promote health and fitness. Incidental PA is PA that is not planned and is the result of daily activities at work, home, or during transportation (Strath, et al., 2013).

According to the AHA, assessment of PA should include the four dimensions of PA and the four domains of PA. The four dimensions of PA include the mode or type of activity; the frequency of performing the activity; the duration of performing the activity; and the intensity of performing the activity. The four domains of PA include occupational, domestic, transportation, and leisure time. According to the AHA it is important to include all of the domains, because a decrease in one domain may be compensated by an increase in another domain (Strath et al., 2013).

The questions used in the GPPAQ meet a number of these assessment recommendations. The GPPAQ includes all of the four domains with questions regarding occupation, time spent doing household chores, purposeful PA, leisure time activity, and time spent performing transportation activities. The dimensions of PA are addressed by questions about the types of PA, the time spent on the PA, and by addressing walking speed. However, the GPPAQ does not address the frequency with which an individual performs PA (NHS, 2009).
The AHA also provides information regarding the selection of questionnaires over other methods of PA assessment such as PA logs, heart rate monitors, pedometers, and accelerometers. Questionnaires have been found to be able to classify individuals in a rank order according to PA level. Questionnaires have a number of benefits. They can be used to screen many people, are relatively inexpensive, have a low patient burden, do not require a large number of personnel, are easy and quick to perform, are able to summarize data, can be done during a single point in time, and allow the provider to provide immediate feedback to the patient. However, questionnaires may not provide as much detail as other methods of assessment (Strath et al., 2013). Questionnaires were chosen for this project due to their low monetary cost, need for few staff resources, and because they enable the provider to give immediate feedback.

**Project Plan**

The project plan was that adult patients ages 18-65 years would be screened for PA levels and those who failed to meet the active PAI category would receive an intervention. For the purpose of this project only one provider was included in the trial project. Discussions with the clinical nurse leader at BC revealed that in the past, rolling out new projects to all of the providers at once could become overwhelming. This led the office to adapt their process to roll out new projects to one provider at a time (M. Williams, personal communication, February, 23, 2016). The DNP-prepared FNP was designated as the provider to be involved with this project. By including only one provider in this project, issues in workflow were addressed to facilitate the expansion of the project to include more providers at a possible future time.
In order to include as many patients as possible during the trial period of three weeks, all patients, ages 18-65, who presented to the project site and who were seen by the DNP-prepared FNP were to be screened for their levels of regular PA, using the GPPAQ. An exception was made for patients who presented for an acute illness or injury, as during these visits a PA screening may not be representative of the patient’s normal PA level. A specific LPN or medical assistant was usually paired with each of the providers, meaning that a change in process only occurred for one LPN during the trial period. This was to help to make the process consistent for both the LPN and the provider, so the LPN would not have to remember which patients needed to be screened, but instead screened all patients who were at the project site for a well visit or chronic disease visit.

The proposed trial period was three weeks. The DNP-prepared FNP spent three days per week seeing patients in 30-minute time periods. There was approximately a 20% no-show rate for patients seen by this provider (T. Sanchez, personal communication, March 9, 2016). Approximately 80% of patients seen by this provider were adults. Accounting for these conditions, the plan was that a sample size of 45-60 adult patients would be obtained.

When patients arrived at the clinic they were registered at the front desk. Patients were then called from the lobby by a LPN who obtained weight, height, vital signs, and performed any necessary screenings before the patient was seen by the provider. Paper copies of the GPPAQ were stored in a drawer in patient rooms, where a depression questionnaire was already kept. Extra copies of the GPPAQ were stored at the desk of the LPN who was involved with the project. By having the GPPAQ located in
a convenient location the LPN was able to quickly obtain the document. The questionnaire was scored using a summary table available for free use from the United Kingdom’s Department of Health website. The summary table (see Appendix B) uses the number of hours spent on physical exercise, hours spent cycling, and type of work to determine PAI (Department of Health, 2013). The LPN was also offered an Excel file for the scoring of the GPPAQ, but she chose to use the summary tables. The LPN was asked to measure how much extra time during rooming the GPPAQ required to obtain and score results. This was done through the use of a stopwatch. The LPN was given a form to fill out the amount time the questionnaire took to complete and chart, for three to four patients daily (see Appendix C).

The theories of reasoned action and planned behavior include information on changing behavior. In order to change the behavior of the medical assistant to include the use of the GPPAQ when rooming patients, she needed information. She was given an explanation of the reason behind the use of the questionnaire, how to score the questionnaires, and the purpose of the questionnaire in relation to the health of patients. These actions were taken to account for the premise of the theories that sharing information with individuals will help change their behavior (Ajzen & Fishbein, 2005).

The PAI level was then entered into the electronic health record (EHR) by the medical assistants. In the EHR used at the clinic there was a location under Social History where PA levels could be consistently charted. In this location there was an “Exercise” section with a four level drop-down box. The labels in the box were similar but not the same as the PAI levels given by the GPPAQ, and were in a rank order so they corresponded to specific PAI levels from the GPPAQ. The drop-down levels in the
EHR were: none, low, moderate, and heavy. In the EHR the PAI level of active could be charted as heavy, moderately active as moderate, moderately inactive as low, and inactive as none.

For depression screenings providers preferred having a paper copy of the questionnaire available to remind them to address the topic if needed. For PA assessment, the same procedure was followed in order to keep activities consistent for both the provider and the medical assistant. The LPN wrote the PAI level at the top of the questionnaire to help the DNP-prepared FNP remember to address the topic during the office visit. Once this became routine, it was expected that having a physical copy of the questionnaire available for the provider might not be necessary. Leaving the paper copy in the room or giving it directly to the provider also allowed the provider to see how much time the patient spent walking, doing housework, gardening, and do-it-yourself projects. The answers to these specific questions are not included in the PAI. If patients spent a lot of time walking the PAI may not be a completely accurate assessment of PA, and would require an assessment by the provider.

For patients who received a PAI of less than active, an intervention should have been performed. This intervention could consist of education and/or a PA referral. This referral could be offered by the provider or by the LPN. The provider or LPN could have the patients see the community health worker (CHW) for help accessing local spaces to perform PA, such as the YMCA Healthy Living Hubs. Patients could make an appointment to see the community health worker when they checked out of their appointment. The provider could also use the clinic’s instant messaging system to determine if the CHW had any time available while the patient was still in the clinic to
help with the referral. The CHW already had a relationship with local community sites that offered free or low cost PA opportunities.

The provider could also discuss ways to increase PA, and the benefits of increased PA levels with patients who did not have a PAI of active. This discussion was based on elements of the Health Promotion Model (HPM). Discussing individual barriers to PA levels and helping the patient find ways to increase his/her ability to perform PA could be associated with increased self-efficacy. When self-efficacy is increased, the likelihood that a behavior will occur will also increase (Pender et al., 2011). The DNP-prepared FNP had a good understanding of the use of the HPM as a way to motivate patients. For patients with a PAI of active, encouragement was appropriate as a means of positive reinforcement. To evaluate whether or not they have made appointments with the community health worker, the project director tracked patients to determine if these appointments were kept, and whether patients were referred to a community PA event by the CHW.

Throughout the process the DNP student was available at the clinic to help with any problems or issues that arise. The DNP student also provided reminders and encouragement to everyone involved with the project to help ensure compliance with the proposed plan. The DNP student also tracked certain disease processes associated with PA in patients who were screened (see Appendix D). These disease processes included hypertension, diabetes, obesity, and hyperlipidemia.

**Evaluation**

There were a number of proposed outcomes for this project. The first goal was that 80% of eligible patients seen by the DNP-prepared FNP during the trial period were
screened for PA level. The second was that 80% of screened patients received a PA intervention of either counseling using the HPM, a PA referral, or both. The third was that 40% of patients who received a PA intervention of PA referral attended a PA event in the community.

Due to recent changes in the EHR at the project site, auditing data from the EHR was taking more time than usual. By limiting the trial to only one provider, the DNP student was able to manually extract data from the social history section of electronic health records of patients seen by the DNP-prepared FNP to determine the percentage of people who were screened for PA using the GPPAQ. The DNP student obtained these data throughout the trial period in order to monitor how the project was progressing and to make any necessary changes if things were not going well.

Data regarding the counseling that was offered and/or PA referral were also audited by the DNP student through a review of the education and discharge instructions that the patients received. It was anticipated that the number of people who attended PA sites in the community could be difficult to obtain from those sites, because many were available. Therefore, the information was obtained through follow-up phone calls to patients to ask if they had been able to attend any community PA sites. During the trial project the DNP student performed the follow-up phone calls. After the trial, if the project site wants to continue with follow-up this process could be done during subsequent office visits or by phone calls performed by nursing staff or medical assistants. Both of these groups already spent some of their work time contacting patients regarding appointments and test results. This was suggested to the project site in the plan for extension of this project to all providers.
Success of the project was judged by accomplishment of goals. The first goal was that at least 80% of adult patients who had an appointment with the DNP-prepared FNP during the trial period who were eligible for the trial project would be screened for PA levels. Of these patients at least 80% were to receive an intervention of counseling using the HPM and/or PA referral. For those who received a PA referral, the goal was that at least 40% would attend a community PA event. This number was low, because the trial time period was short. The YMCA community program offered sessions at least once per week. Although a large percentage of individuals living in the community did not own their own car, there are a number of bus routes in the area, meaning that transportation was available (The Rapids, 2016).

Data were collected by the DNP student using data collection tools that were designed by the DNP student specifically for this project (see Appendix E). As data were collected it was stored at the project site throughout the project on computers that required a password to access information from them. Data were only removed from the project site after being completely de-identified. Results from the data collection tools were used to determine if project goals were met.

Chapters 5 and 6 will include a discussion of the project results. Effectiveness, feasibility, and sustainability of the project will be discussed. The various roles of the DNP in relation to the project will also be included. Limitations of the project and recommendations will be presented.
CHAPTER 5

PROJECT OUTCOMES

This project was implemented after receiving a designation of not research from both Grand Valley State University and the healthcare organization (see Appendices F and G). There were a number of outcomes of this project at the project sites. These outcomes included the number of adult patients ages 18-65 who received care for a chronic disease follow-up or well visit at the project site from the DNP-prepared FNP during the trial period and who were screened for PA level. The second outcome was the number of patients who had a physical activity level of less than active charted, and who received an intervention. These interventions included either education/counseling and/or a referral to the CHW assistance with PA resources. The number of patients who went to see the CHW was tracked as well. From this information the number of patients who went to a physical activity event in the community was tracked.

Screening

Screening of adult patients using the GPPAQ was performed by the participating provider’s assigned LPN. The DNP student provided training on the use of the GPPAQ to the LPN through the use of a handout (see Appendix H). Training regarding the use of the GPPAQ occurred the week before project implementation to give the LPN an opportunity to look over the handout prior to screening patients and to have questions answered. The DNP student was available for any questions regarding the use of the GPPAQ, scoring, and appropriate patients for its use throughout the initial days of the implementation. Occasionally at the project site other medical assistants or LPNs helped with providers they were not usually assigned to assist. When this occurred, the
medical assistant was approached by the DNP student to determine if she would also be willing to participate in screening patients. The primary LPN involved in the project received the most thorough training from the DNP student, and was able to screen appropriate patients when she was working with the DNP-prepared FNP.

Throughout the three-week trial period, 71 adult patients, ages 18-65, received care from the DNP-prepared FNP. Of these, 47 were seen for an acute visit or were non-English speaking, and were not appropriate to be screened. Twenty-four patients were seen for a chronic or well visit. Twenty-one of the twenty-four chronic or well visit patients were screened for PA level using the GPPAQ. This was determined by chart audits after patient visits to determine if a physical activity level was charted under social history. The dropdown box under social history was used to chart PA level. During the trial period the DNP-prepared FNP suggested that the actual results of the GPPAQ were written in the comments section after the box. Of the chronic visit patients screened six were active, three were moderately active, ten were moderately inactive, and two were inactive.

Throughout the implementation process, three acute visit patients were screened by the LPN as well. Of these patients one was screened as active, one as moderately active, and one as inactive. The LPN may have performed these additional screenings because the reason for visit may have appeared to have been for a chronic care visit. However, when the provider assessed the patient it became an acute visit.

The LPN was asked to determine how much additional time it took to perform and chart these screenings. She was given a stopwatch to measure the time it took for these screenings to occur and asked to use it when possible. She was able to time 17
of these screenings. On average the screenings and charting of results took 33.24 seconds to complete.

**Interventions**

Patients who had a PA level of less than *active* were eligible for an intervention. Interventions used in this project included education/counseling from the DNP-prepared FNP and/or referral to the CHW. Interventions were determined through chart audits. As the DNP student was not in the room for patient visits, education/counseling was determined as being done if some sort of education or statement regarding PA improvement was included in the discharge summary. This could include a PA handout already built into the EHR that was available for use. A referral to the CHW was determined by audits of discharge instructions. The plan to audit charts can be seen in Figure 2.

Twelve of the twenty-one patients who were seen by the DNP-prepared FNP for a chronic visit and were screened for PA level using the GPPAQ received an intervention during the trial period. Seven patients received education/counseling from the DNP-prepared FNP. Five patients were referred to the CHW for help finding free or low cost physical activity opportunities in the community.

Seven patients who were not screened for PA level also received a PA intervention. One chronic visit patient who was not screened for PA level received education/counseling. Three acute visit patients received education/counseling and two acute visit patients were referred to the community health worker. A summary of results can be seen in Figure 3.
Figure 2

*Chart Audit Plan*

Adult patient seen by Doctor of Nursing Practice-prepared Nurse Practitioner

Patient seen for acute disease visit or non-English speaking

- Not eligible for Physical Activity (PA) screening

- Screening performed

- Screening result less than *active*

- Eligible for intervention

- No intervention

- PA counseling/education

Patient seen for chronic disease visit or wellness visit

- Eligible for PA screening

- No screening performed

- Screening result *active*

- Not eligible for intervention

- Intervention occurred

- Referral to Community Health Worker

Kept appointment

- Did not keep appointment

Not referred to PA event

- Referred to PA event in community

Attended event

Did not attend event
Figure 3

Project Results

71 adult patients seen by Doctor of Nursing Practice-prepared Family Nurse Practitioner during trial period

47 acute visits of non-English speaking
24 chronic disease or well visits

5 interventions occurred

2 referred to community health worker (CHW)

3 Education/counseling

Appointments not kept

21 patients screened for physical activity (PA) level

15 less than active
6 active

3 No intervention
12 Received intervention

5 referred to CHW

5 interventions occurred

3 patients not screened for physical PA level

1 received education/counseling

Community Health Worker Referral

After patients were asked to make an appointment with the CHW for assistance with finding opportunities to participate in physical activity events in the community,
chart audits were performed to determine whether an appointment was made. This was determined by reviewing the upcoming appointment section of the electronic health record. Seven patients were asked to make an appointment with the community health worker; of these only one made an appointment.

Currently, the CHW does not chart in the EHR, however this may be occurring in the future (personal communication, C. Harvey, May, 20, 2016). Because of this, the CHW helped the DNP student determine if patients were referred to PA events in the community. One patient was referred to these events. The DNP student made follow-up phone calls to this patient to determine if the patient had yet participated in one of these community physical activity events. The DNP student was unable to contact the patient who was referred to a PA event in the community.

The need to access the CHW’s charting outside of the EHR was a limitation. The CHW visits were visible in the EHR’s daily schedule, however these were not visible for individual patients if the appointment had already occurred. After the completion of the project it was discovered that appointments made with the CHW may have occurred the same day as the DNP-prepared FNP appointment. No appointment would have then been seen in the EHR. These patients would have been considered to have not made an appointment, even though they may have occurred. This made it more difficult and time-consuming than expected to track CHW appointments. If in the future the CHW charts in the EHR, providers and staff will have more knowledge of what occurs during these appointments.
Patients Screened

To help determine the need for a PA intervention in this patient population the DNP student assessed certain PA-associated disease processes in the patients screened. The disease processes assessed were hypertension, diabetes, obesity, and hyperlipidemia. Past medical history and lipid level results in the electronic health record were reviewed. This information was tracked for patients seen for chronic and acute visits who were screened for PA level using the GPPAQ.

In the population screened, hypertension and obesity were the most frequent diagnoses. Of the patients screened, 15 had diagnoses of hypertension, and 16 had been diagnosed as obese. Diabetes and hyperlipidemia were less frequent in the patients screened for PA. Of the patients screened, eight patients had diabetes and six had dyslipidemia.

Success of Project

Before the implementation of the project, the logic model was used to guide project development. A goal of the project was that at least 80% of patients who were eligible to be screened would be screened using the GPPAQ. A second goal was that at least 80% of patients screened, would receive some sort of intervention. A third goal was that at least 40% of patients who were referred to the CHW would attend a PA event in the community.

During the trial period of three weeks there was a goal to have a sample size of 45-60 adult patients. This goal was met, as a total of 71 adult patients received care from the DNP-prepared FNP during the trial period. During the trial period, 24 patients received care for a chronic or well visit. Of these 24 patients, 21 were screened for PA
level using the GPPAQ. This was 87.5% of patients eligible to be screened, surpassing the 80% goal.

Of the 21 chronic or well visit patients who were screened for PA level, 12 received an intervention. These interventions included both education/counseling and referral to the CHW. This was 57% of patients. This percentage did not meet the goal of 80% of patients screened receiving an intervention. However, 80% of the patients who were screened and found to be less than active did receive an intervention.

Only one of the five chronic care patients who were referred to the CHW attended an appointment with the CHW. Neither of the two adults seen for acute care visits who received a referral to the CHW made an appointment. The goal of 40% of patients who were referred to the CHW attending a PA event in the community was not met.

**Conclusion**

The results described above are discussed in further detail in the next chapter. Seven patients who were not screened for PA level received an intervention. This shows that screening only a limited number of patients can have beneficial effects on other patients, as the inclusion of PA interventions become more routine in patient visits. The amount of time that it takes to perform the screening and the financial impacts this could have for the practice will also be discussed in the following chapter.
CHAPTER 6
DISCUSSION

This chapter includes a discussion of findings of this trial project, its implications to the DNP role, and the feasibility of extending this project to more providers at the project site. Limitations of the project and future recommendations are also discussed.

Summary of Results

The three-week trial period of this project involved only the adult patients of the participating DNP-prepared FNP. Seventy-one adult patients received care from the DNP-prepared FNP; of these, 47 received care for an acute visit or were non-English speaking and were not appropriate to be screened based on project guidelines. Twenty-four patients received care for a chronic or well visit, of these 21 were screened for PA level using the GPPAQ. These results can be seen in Figure 3 in Chapter 5. By limiting screenings to only chronic care or well visit patients the time commitment required for screenings is lessened. During acute visits more time may be required for diagnosis and treatment planning than during a chronic illness visit. The inclusion of PA in a chronic disease or wellness visit may be more likely to occur as the provider’s focus is more likely to be on health promotion and disease prevention.

Throughout the project a few acute illness patients were screened for PA level by the involved LPN. Determining whether a patient is being seen for a chronic or acute visit can be difficult to determine from their reason for visit as charted in the electronic health record. This may be why a few acute illness patients were screened.

There were also a few patients who did not receive a PA assessment, or were seen for an acute visit, who did receive an intervention. Acute illness visits often touch
on more than one health issue, and chronic health issues during these visits are sometimes addressed. Chronic illnesses being addressed during an acute illness visit may have been the reason PA interventions occurred during these visits. This also may have occurred as including PA into the office visit became more routine for the DNP-prepared FNP.

One concern at the beginning of this project was that the screening process could be too time consuming during the rooming process. On average, screening using the GPPAQ took 33.24 seconds. Discussions with the LPN regarding including the screening in the rooming process revealed it was not difficult, and she did not find that the screening made her fall behind in her day.

The results obtained with the Data Collection Tool for Associated Disease Processes (see Appendix D) showed that a number of patients being seen at the project site had disease processes associated with PA levels. Also important to remember are the patients who were screened who did not have these disease processes. Low levels of PA are associated with a risk for these problems, and a PA intervention may help to decrease the likelihood of the diseases occurring in the future. In the Health Promotion Model this would be a perceived benefit of action that the provider may have used when discussing the importance of PA with the patient.

The goal of 80% of patients receiving a PA intervention after screening was met. Education guides in the electronic health record and an interest in PA from the DNP-prepared FNP were important factors in the success of this part of the project. Initially, interventions were slow to occur. However, reminders from the DNP student to the participating provider about including PA interventions in visits helped to increase the
number of interventions that occurred and were charted in the EHR. This shows that it takes time to change the routine practice of healthcare providers. If the office chooses to continue this project with all providers having someone available to provide these reminders will be beneficial.

Referrals to the CHW were not successful. Only two of the seven patients referred to the CHW set up an appointment with the CHW. Of these, only one kept an appointment with the CHW. Unfortunately, after several attempts the DNP student was unable to contact this patient. This finding of only one patient attending an appointment with the CHW may show a lack of interest on the part of patients to attend PA programming in the community. Discussion with the CHW revealed that patients often agree to see her when asked by providers, but follow through can be an issue (C. Harvey, personal communication, May, 20, 2016).

From the logic model desired outcomes included staff knowledge of the HPM, GPPAQ results, and available interventions. The DNP-prepared FNP involved with the project did have a good understanding of the HPM. The use of the HPM could be seen in patient discharge summaries where benefits of PA were included. Information regarding the HPM will be available for other providers and staff members when the results of this project are disseminated to the site. The DNP-prepared FNP was able to successfully integrate both PA referral and counseling/education into patient visits. The LPN agreed to assess PA using the GPPAQ, was able to successfully use and score the questionnaire, and was able to understand the results of the GPPAQ.

More long-term outcomes from the logic model included increased PA levels for previously sedentary adults and a decrease in severity and prevalence of chronic
diseases impacted by PA levels. These long-term effects were not seen due to the short
time-frame of this project. The small sample size of this project also makes it unlikely
these effects will be seen. However, if this project was implemented throughout the
office a decrease in the severity and prevalence of chronic disease may be seen over a
longer period of time.

Knowledge of certain elements of the Burke-Litwin model (1992) were expanded
during this project and the importance of certain elements became more important as
the project progressed. The culture of the organization had revealed that individuals
have a desire to work with low income individuals. Throughout the project it was also
revealed that staff were willing to learn new tasks in order to improve patient care. This
can also be seen in the task requirements and individual skills and abilities section of
the Burke-Litwin Model. The important role that the clinical nurse leader and community
health worker plays in the organization are also an important part of the element of
individual skills and abilities. The provider and the LPN worked in the same room
between patient visits. Before project implementation this was not seen as important but
was beneficial in the success of screenings and interventions. By being in the same
room the LPN could give the questionnaire directly to the DNP-prepared FNP and tell
him the patient’s PA level.

Limitations

There were a few limitations to this project. Only one provider was included in
this trial project. This means that before the project can continue at the office all of the
providers will require additional training. Also, only one LPN received extensive training
on the use of the GPPAQ. Office-wide implementation of this project will require that all
of the medical assistants and LPNs in the office receive training in the use of the GPPAQ (a project implementation guideline can be found in Appendix J).

Based on project guidelines, only 24 patients were eligible to be screened during the implementation of this project. A small sample size was obtained even though most eligible patients were screened. The small sample size led to few referrals to the CHW and only one referral to a physical activity event in the community was made. Requiring patients to set up an appointment with the CHW to be referred to a PA event in the community may have posed a barrier to some patients, and having lists of available community events promoting physical activity to give to patients may be beneficial in the future.

**DNP Role**

Throughout this project the various roles of the DNP were enacted. These roles include clinician, advocate, scholar, and educator. These roles occurred throughout the design, implementation, and analysis of project results. Informatics and policy, other essentials of doctoral education for the advanced practice nurse, were also addressed through this project.

**Clinician**

Interest in this project stemmed from the DNP student's own clinical background. The DNP student had worked in the neurology area for several years, developing a strong interest in the care of patients following a cerebrovascular accident (CVA). Knowledge of modifiable risk factors for a CVA led to an interest in PA. Modifiable risk factors for a CVA include hypertension, obesity, hyperlipidemia, and diabetes. All of these disease processes are affected by PA levels.
Seeing the oftentimes devastating effects of CVAs showed the DNP student the importance of disease prevention and health promotion. The effects of a CVA are often permanent and leave the individual affected with lifelong deficits. In her role as a nurse caring for CVA patients it was clear how many patients were unaware of how seriously these disease processes could affect their overall health. Many patients have an interest in controlling these diseases after a CVA. Knowledge of the importance of prevention led the DNP student to desire to help decrease these risk factors in patients.

This work on a PA intervention project taught the DNP student the importance of health promotion and disease prevention. When the DNP student begins working as a nurse practitioner this can be included in her own practice. Including PA interventions during client encounters can help improve health outcomes and decrease cost of care by helping to prevent chronic diseases. Knowledge of evidence-based interventions to increase PA levels can be used in her work as a nurse practitioner.

**Advocate**

The role of the DNP as an advocate was demonstrated in this project. Although most providers are aware of the importance of PA it is rarely brought up during patient visits due to numerous other competing demands. Throughout the planning and implementation of the project the DNP student spoke of the importance of including PA assessment in patient visits and advocated for PA intervention in primary care visits.

Along with advocating for the assessment and intervention of PA, the DNP student also advocated for providing patients with the knowledge and abilities for health promotion and disease prevention. PA was presented to patients as a means to manage their own health. The DNP student advocated for patients to be given
knowledge of the benefits of increased PA levels and for access to low cost and free physical activity events.

**Scholar**

The DNP role of scholar was shown primarily in the project through the completion of a literature review, planning of the project based on theory, and analysis of data. A logic model was used to guide development of the project. The Burke-Litwin Model was used to help better understand the organization and to ensure that the project was designed with the unique needs and skills of the organization in mind. Ajzen and Fishbein’s theories of planned behavior and reasoned action were used to help guide education of the LPN. According to the theories of Ajzen and Fishbein sharing information with individuals will help to change their behavior. Sharing information with the LPN related to the GPPAQ helped motivate her to change her behavior. The HPM helped to guide the provider as he discussed PA with patients. The use of the HPM was seen in discharge summaries through inclusion of benefits of action and recommendations for ways to decrease barriers to action.

The use of theories in the project taught the DNP student the importance of basing education on theories. The use of the HPM helped guide conversations the DNP-prepared FNP had with patients. The theories of Ajzen and Fishbein helped provide a basis for education for the LPN. Using these theories taught the DNP that the use of models focuses education so that the individuals involved are able to effectively change their practice.

A comprehensive literature review including both disease processes associated with PA, as well as PA interventions in primary care, also show the scholarly role of the
DNP student. A thorough review of the literature helped to demonstrate that this project was based on evidence and had the potential to have a positive effect on the patients included in the project.

Including outcomes in the project and the evaluation of these outcomes enabled the DNP student to determine the success of this project in certain areas and opportunities for change in others. Outcomes demonstrate sustainability and will be important information for the organization when they determine if they continue this project with all providers. Providers will likely want to know the amount of time the assessment takes and the feasibility of including PA intervention into patient visits. It was beyond the scope of this project to demonstrate the effectiveness of interventions to increase PA levels. However, providers may want to track this information in the future.

**Educator**

The role of educator was prominent in this project and will continue through dissemination. In the planning stages of this project it quickly became clear that success of the project was dependent on the success of PA screenings occurring.

Due to this, a training guideline for the use of the GPPAQ was developed. The guideline was developed in order to focus education for the LPN and to provide a reference to the LPN when the DNP student was not available. This guideline included information such as who to screen, why the screening was occurring, how to score the GPPAQ, and how to chart the results of the GPPAQ. Thorough education for the involved LPN was extremely beneficial. By providing training for the LPN regarding the
use of the GPPAQ, she was able to quickly become proficient with the use of the tool. This likely led to the high number of completed screenings.

Through dissemination, the educator role will continue to be prominent. During dissemination, providers will be given education regarding the HPM and examples of how to use the model (see Appendix I). This education will help them be able to use concepts from the HPM when working with patients. Other medical assistants and nursing staff who room patients will also be given information on the use of the GPPAQ and the reason for its use.

Informatics

One of the Essentials of Doctoral Education for Advanced Practice Nursing according to the American Association of Colleges of Nursing (AACN, 2006) is competent use of information technology. This essential requires the advanced practice nurse to be able to collect data from information systems. During this project it was required that the DNP student manually extract data from the EHR. This was required due to recent changes in the EHR. At the time of this project, extraction of data by the informatics department was months behind schedule.

By extracting data manually, the DNP student was able to learn the importance of having data available in places that could be easily analyzed. In the future if providers would like to determine PA levels of the patient population at the project site, having PA levels charted consistently in the same location for all patients will make it possible for this to occur. The DNP student was also able to use education materials related to PA already built into the EHR during this project. The use of education materials embedded
into the electronic health record makes the inclusion of these materials into patient discharge instructions more likely to occur.

**Policy**

Other *Essentials of Doctoral Education for Advanced Practice Nursing* are related to policy analysis and implementation. These essentials deal with quality improvement, interprofessional collaboration to improve health outcomes, and population health (AACN, 2006). Throughout the process of this project the DNP student worked in these areas. Collaborating with the CHW, CNL, DNP-prepared FNP, and the LPN, the DNP student implemented a project that has the potential to have an impact on population health. The implementation of PA screening and intervention at the project site has the potential to help improve blood pressure control, decrease obesity rates, improve glycemic control, and lower cholesterol levels in patients.

Prevention is an important part of the healthcare system (Agency for Healthcare Research and Quality, 2015). Policy changes in healthcare that are related to prevention and health promotion are important ways to manage healthcare costs. A project related to prevention is in keeping with current policy changes in the healthcare system where preventative care is being emphasized. This is in line with the *Triple Aim* of the Institute for Healthcare Improvement. The goal of the *Triple Aim* is to improve the patient experience, improve population health, and reduce the per capita expense of healthcare (Institute for Healthcare Improvement, 2016). A PA intervention improves the patient experience by increasing quality of care, improves population health by providing preventive care, and reduces healthcare costs by providing a cost-effective
treatment. According to the American College of Sports Medicine (ACSM) PA interventions are cost-effective ways to improve the health of individuals.

Extension of Project and Recommendations

This project was designed to be a trial project to show feasibility of including PA assessment and intervention in primary care patient visits. The results of this project will be shared with office providers and the office manager so they can determine if they would like to include PA assessment and intervention in more office visits. It may also be possible to include a PA prescription intervention, because the Kent County Health Department started an initiative using pre-printed prescription pads for providers in the area (personal communication, T. Sanchez, July 13, 2016). A plan for continuation of this project to all providers is included in Appendix J.

The call to action from the ACSM to include PA screening in every office visit stressed the importance of PA as a cost-effective treatment for chronic disease and its ability to help reduce healthcare costs. The ACSM also discussed the importance of teaming with local community organizations for physical activity events (Sallis, et al., 2016). The implementation of PA assessment and intervention in primary care fits well with current guidelines, and the ability of the DNP to advocate for its inclusion in medical visits is important.

Both LPNs and medical assistants were used to help room patients at the project site. The time associated with completing the GPPAQ does have a cost involved. The median pay of LPNs was $20.34 per hour, at the time of the project, and the median pay of medical assistants was $15.59 per hour. This averaged to $17.97 per hour. There is an average of 300 provider visits per week. Approximately 150 of these visits
may be adult chronic illness visits. Given these estimates, during one week up to 150 patients could be screened for PA by the LPNs and medical assistants during chronic illness or well visits. For one week of 150 screenings the cost to the organization would be $24.89. Over one year this cost would be approximately $1,294.20.

Training for LPNs and medical assistants related to screening and training for providers related to intervention also has a cost associated with it. For a 30-minute training session for eight medical assistants and LPNs the cost would be approximately $143.72, depending on the mix of staff. Education for providers will also cause the office to lose income from lost office visits. For a 30-minute educational period providers, at least one office visit for each provider will have to be used for education to be completed. A common current procedural terminology (CPT) code used in primary care is 99213. For six providers the cost associated with the loss of six 99213 CPT codes to the office would be approximately $438 (EM University, 2016b). The individual(s) providing training to staff and providers will also require payment.

While these costs may be significant to the organization it is important to remember that increases in PA levels of patients who receive an intervention may have cost benefit to the organization as well. Higher levels of PA in patients may lead to better hypertension, diabetes, and hyperlipidemia control which could lead to higher levels of reimbursement. The possibility of higher levels of reimbursements is related to a number of quality indicators. The Centers for Medicare and Medicaid Services (CMS) have a number of quality indicators that when met lead to higher levels of reimbursement. There are quality indicators related to blood pressure control, diabetes management, and follow-up for elevated body mass index (CMS, 2016).
International Classification of Diseases, tenth edition (ICD-10) codes in relation to physical activity and counseling may be used. These codes include *Lack of physical exercise, Z72.3*, and *Counseling, unspecified, Z71.9*. Both of these codes are billable codes. These codes may enable to provider to change their CPT code level. For example, the use of these ICD-10 codes may help the provider move up one CPT code. Moving from a 99213 CPT code to a 99214 CPT code would increase the reimbursement to the office by $35 per visit (EM University, 2016c). For less complex visits changing from a 99212 CPT code to a 99213 CPT code would increase reimbursement by $29 per visit (EM University, 2016a). If the inclusion of a discussion of PA and/or a PA intervention allowed the provider to change their CPT code up one level, ten times per week, the office could make approximately $300 extra in reimbursement weekly per provider. Over a year this could lead to $15,600 in additional reimbursement. This would offset the cost associated with training providers and staff.

The assessment of PA for patients will require a change in the normal routine of the LPNs and medical assistants. It will require that additional questions be asked of the patients and that additional information be examined by the healthcare providers. However, additional training of the LPNs and medical assistants could empower them with the ability to address the results of the GPPAQ with patients, and to offer suggestions for ways to incorporate more PA into individuals’ daily lives.

As PA is currently rarely addressed in most primary care visits, time and effort will be required for healthcare providers to start incorporating PA assessment and intervention into visits and for it to become routine. Throughout the trial project the DNP student was at the office for at least part of the day during many days to provide
reminders to include PA interventions into the office visit. A recommendation for the continuation of this project at the project site or at another office would be for an individual to be available to remind providers and staff to perform PA assessments and interventions until the process starts to become more routine. During the trial project the investigator placed reminders near computers where charting was performed to help remind the provider to include PA interventions in his visits. This could easily be done in the future for other providers.

This project used paper copies of the GPPAQ. The switch to AthenaHealth occurred in January of the project year and few modifications were being done to the EHR. However, in the future the integration of a screening tool into the EHR may be possible. If this could be done the assessment of PA and the scoring process could become less complex, making it more likely to occur.

Most of the patients who were referred to the CHW either did not make appointments with her or did not attend these appointments. Patients may have agreed to these appointments when taking to their providers but may not have actually been ready to implement any sort of change in relation to PA in their lives. To prevent unnecessary referrals to the CHW a change readiness questionnaire may be useful. The *Physical Activity Stages of Change Measure* was developed based on the transtheoretical model (Prochaska & DiClemente, 1982) and measures readiness to change in relation to PA (Pekmezi, Barbera, & Marcus, 2010). The use of this measure may help ensure that only patients who are ready to become physically active are referred to the CHW. This would ensure that available resources are not wasted.
The outcomes of this project and the plan presented here could be used in other offices. However, many offices do not have access to a CHW which may make referral to physical activity events in the community more difficult. Even without a CHW a different site could use the plan presented here to integrate the assessment of PA using the GPPAQ into an office visit. If community physical activity events were not available in the area, education and counseling could still be used as a PA intervention.

**Conclusion**

This trial project that aimed to screen adult patients seen for chronic illness and well visits for PA, and to provide a PA intervention to patients not meeting recommended PA levels, was completed over a three-week period in Spring of 2016. After evaluating data collected during the trial period it can be concluded that a number of outcomes were successfully met. The goal of 80% of eligible patients screened and the goal of 80% of eligible patients receiving interventions was met. The goal of 40% of patients referred to physical activity programming in the community was not met. This trial project did show that a PA assessment using the GPPAQ can be successfully integrated into a primary care visit. PA assessment required minimal time from the LPN, averaging only 33.24 seconds per screening and at minimal cost to the organization, only $24.89 weekly. Integration of PA interventions can also successfully occur during the visit. Recommendations from this trial could help the project site include a PA assessment and intervention into more office visits.
Appendix A

General Practice Physical Activity Questionnaire

Date……………………..

Name……………………..

1. Please tell us the type and amount of physical activity involved in your work. Please check one box that is closest to your present work from the following five possibilities:

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>Please mark one box only</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>I am not in employment (e.g. retired, retired for health reasons, unemployed, full-time career etc.)</td>
<td></td>
</tr>
<tr>
<td>b</td>
<td>I spend most of my time at work sitting (such as in an office)</td>
<td></td>
</tr>
<tr>
<td>c</td>
<td>I spend most of my time at work standing or walking. However, my work does not require much intense physical effort (e.g. shop assistant, hairdresser, security guard, childminder, etc.)</td>
<td></td>
</tr>
<tr>
<td>d</td>
<td>My work involves definite physical effort including handling of heavy objects and use of tools (e.g. plumber, electrician, carpenter, cleaner, hospital nurse, gardener, postal delivery workers etc.)</td>
<td></td>
</tr>
<tr>
<td>e</td>
<td>My work involves vigorous physical activity including handling of very heavy objects (e.g. scaffolder, construction worker, refuse collector, etc.)</td>
<td></td>
</tr>
</tbody>
</table>

2. During the last week, how many hours did you spend on each of the following activities? Please answer whether you are in employment or not

<table>
<thead>
<tr>
<th></th>
<th>None</th>
<th>Some but less than 1 hour</th>
<th>1 hour but less than 3 hours</th>
<th>3 hours or more</th>
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<tr>
<td>a</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b</td>
<td></td>
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<td>e</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
3. How would you describe your usual walking pace? Please mark one box only.

- Slow pace (i.e. less than 3 mph)
- Steady average pace
- Brisk pace
- Fast pace (i.e. over 4 mph)

Hit 'Return' to calculate PAI

---

### Appendix B

#### Summary Table

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<tr>
<th>Physical exercise and / or cycling (hr/wk)</th>
<th>Sedentary</th>
<th>Standing</th>
<th>Physical</th>
<th>Heavy Manual</th>
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<tbody>
<tr>
<td>0</td>
<td>Inactive</td>
<td>Moderately Inactive</td>
<td>Moderately Active</td>
<td>Active</td>
</tr>
<tr>
<td>Some but &lt; 1</td>
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<td>Moderately Active</td>
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<td>Active</td>
</tr>
<tr>
<td>1-2.9</td>
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<td>Active</td>
<td>Active</td>
<td>Active</td>
</tr>
<tr>
<td>≥ 3</td>
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</table>

<table>
<thead>
<tr>
<th>Cycling</th>
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<th>Some but &lt; 1</th>
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<th>≥3</th>
</tr>
</thead>
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<td>0</td>
<td>Some but &lt; 1</td>
<td>1-2.9</td>
<td>≥3</td>
</tr>
<tr>
<td>Some but &lt; 1</td>
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</table>

### Appendix C

#### Time Measurement Tool

<table>
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<tr>
<th>Day</th>
<th>Patient</th>
<th>Time to complete GPPAQ (seconds)</th>
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<td>Patient 1</td>
<td></td>
</tr>
<tr>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>Patient 3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Patient 4</td>
<td></td>
</tr>
<tr>
<td>Day 2</td>
<td>Patient 1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Patient 2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Patient 3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Patient 4</td>
<td></td>
</tr>
<tr>
<td>Day 3</td>
<td>Patient 1</td>
<td></td>
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<tr>
<td></td>
<td>Patient 2</td>
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<td>Patient 3</td>
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<tr>
<td></td>
<td>Patient 4</td>
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</table>
Appendix D
Data Collection Tool for Associated Disease Processes

Mark if screened patient has disease process:

<table>
<thead>
<tr>
<th>Disease</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Diabetes</td>
<td>XXXXXXX  8</td>
</tr>
<tr>
<td>Hypertension</td>
<td>XXXXXXXXXXXXXX  15</td>
</tr>
<tr>
<td>Obesity</td>
<td>XXXXXXXXXXXXXX  16</td>
</tr>
<tr>
<td>High Cholesterol</td>
<td>XXXXX  6</td>
</tr>
</tbody>
</table>
## Appendix E
### Data Collection Tool

<table>
<thead>
<tr>
<th>Patient Name</th>
<th>Is the patient here for an acute visit?</th>
<th>Was the patient screened for PA?</th>
<th>What was the result of the screening?</th>
<th>Was a PA intervention done?</th>
<th>What type of intervention was done? Counseling using HPM or a PA referral?</th>
<th>If a PA referral was done did the patient make an appointment with the community health worker?</th>
<th>Did the patient go to the community health worker appointment?</th>
<th>Did the patient attend a PA session in the community?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1  Example, 1</td>
<td>yes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2  Example, 2</td>
<td>no</td>
<td>yes</td>
<td>none</td>
<td>yes</td>
<td>PA referral</td>
<td>yes</td>
<td>no</td>
<td></td>
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<tr>
<td>3  Example, 3</td>
<td>no</td>
<td>yes</td>
<td>low</td>
<td>yes</td>
<td>Both</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
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<td>4</td>
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</tr>
</tbody>
</table>
Appendix F

Not Research Designation from Grand Valley State University

DATE: May 9, 2016

TO: Michelle VanDenToorn, BSN
FROM: Grand Valley State University Human Research Review Committee
STUDY TITLE: [506265-1] Physical Activity Assessment and Intervention Among Adult Patients at Community Health Center
REFERENCE #: New Project
SUBMISSION TYPE: NOT RESEARCH
ACTION: NOT RESEARCH
EFFECTIVE DATE: May 9, 2016
REVIEW TYPE: Administrative Review

Thank you for your submission of materials for your planned research study. It has been determined that this project does not meet the definition of covered human subjects research* according to current federal regulations. The project, therefore, does not require further review and approval by the HRRC.

If you have any questions, please contact the Research Protections Program at (616) 331-3197 or rpp@gvsu.edu. The office observes all university holidays, and does not process applications during exam week or between academic terms. Please include your study title and reference number in all correspondence with our office.

*Research is a systematic investigation, including research development, testing and evaluation, designed to develop or contribute to generalizable knowledge (45 CFR 46.102 (g)).

Human subject means a living individual about whom an investigator (whether professional or student) conducting research obtains data through intervention or interaction with the individual, or identifiable private information (45 CFR 46.102 (f)).

Scholarly activities that are not covered under the Code of Federal Regulations should not be described or referred to as research in materials to participants, sponsors or in dissemination of findings.

Research Protections Program | 1 Campus Drive | 124 James H. Zumberge Hall | Allendale, MI 49401
Phone: (616) 331-3197 | rpp@gvsu.edu | www.gvsu.edu/rpp

- 1 -
Appendix G

Notice of Clinical Quality Improvement Measurement Designation

NOTICE OF CLINICAL QUALITY IMPROVEMENT MEASUREMENT DESIGNATION

To: Michelle VanDenToorn, RN, BSN, DNP-student

Re: IRB# 16-0512-9
Physical Activity Assessment and Intervention Among Adult Patients at Community Health Center

Date: May 13, 2016

This is to inform you that the Regional Institutional Review Board (IRB) has reviewed your proposed research project entitled "Physical Activity Assessment and Intervention Among Adult Patients at Community Health Center. The IRB has determined that your proposed project is not considered human subjects research. The purpose and objective of the proposed project meets the definition of a clinical quality improvement measurement. All publications referring to the proposed project should include the following statement:

"This project was undertaken as a Clinical Quality Improvement Initiative at and, as such, was not formally supervised by the Regional Institutional Review Board per their policies."

The IRB requests careful consideration of all future activities using the data that has been proposed to be collected and used "in order to assess quality of the physical activity and intervention processes among adult patients in a community health center."

The IRB requests resubmission of the proposed project if there is a change in the current clinical quality improvement measurement design that includes testing hypothesis, asking a research question, following a research design or involves overriding standard clinical decision making and care.

Please feel free to contact me if you have any questions regarding this matter.

IRB Chairperson

Copy: File

Institutional Review Board
Appendix H

Training Regarding Use of the GPPAQ for License Practical Nurse

- **Introduce General Practitioners Physical Activity Questionnaire (GPPAQ)**
  - Short questionnaire composed of only three questions
  - Designed for use in adults
  - Should take less than one minute to complete
  - The questions are close-ended only requiring occupation and then amount of time spent in various activities

  *Explain to patients as a questionnaire to measure physical activity levels. We are doing this because physical activity levels have a large impact on a person's overall health.*

- **Currently only patients seen by the DNP prepared NP will be screened for physical activity level**
  - Adult patients ages 18-65 will be included in this project
  - Only patients being seen for a chronic care or well visit will be screened for physical activity (examples: hypertension visit, diabetes visit, annual health maintenance exam)
  - Exclude patients being seen for an acute reason (examples: cold/flu symptoms or back pain)

  *Exclude any non-English speaking patients
  Exclude patients under 18 years of age
  Exclude patients over 65 years of age*

- **Paper forms of the GPPAQ will be stored in exam rooms in a folder next to the depression questionnaire (PHQ-9)**

  *Complete the GPPAQ during the same time period when the PHQ-9 is completed*

- **Discuss scoring of GPPAQ with LPN**
  - GPPAQ can be scored with an Excel file available free of use from the United Kingdom’s government website
    - Hit return to calculate physical activity level after marking
responses to the three questions
  o GPPAQ can also be scored using summary tables which are also available from the United Kingdom’s government website – copies of these read codes can be placed near the GPPAQ questionnaires in every room
    ▪ Combine number of hours spent performing physical activity and bicycling
    ▪ Using table match this number with occupation type to determine physical activity level
  o Results are a physical activity index: 
    *active, moderately active, moderately inactive, or inactive*

  **Documentation**
  o Result should be written on the top of the questionnaire and left in the room for the provider to see
  o Results should also be placed in Athena under the Social History section
    ▪ Go to “Exercise” section where there is a four level drop down box
      • Chart *Active as Heavy*
      • Chart *Moderately Active as Moderate*
      • Chart *Moderately Inactive as Low*
      • Chart *Inactive as None*
### Appendix I

**HPM Examples**

<table>
<thead>
<tr>
<th>Content</th>
<th>Suggested Approach</th>
<th>Theory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of time</td>
<td>We all lead very busy lives and finding time to include physical activity into already full schedules can be challenging. You can start by incorporating physical activity into things you are already doing. Park in spot far away from the entrance to a store or work to get a short walk in. If you watch tv you can jog in place, do jumping jacks or sit-ups during commercial breaks. Or try and schedule short physical activity sessions into your week, even if you can’t find time to do 150 minutes of physical activity weekly doing some will provide health benefits.</td>
<td>Perceived barriers decrease the likelihood that a behavior change will occur. By lessening perceived barriers to a behavior change the change is more likely to occur (Pender, Murdaugh, &amp; Parsons, 2011)</td>
</tr>
</tbody>
</table>
| Patient doesn't think they will be successful | Have you ever done any type of physical activity in the past?  
Do you have a friend or family member that exercises that would be willing to exercise with you?  
Why don’t you think you will be successful?                                                                                                                                                                     | An individual’s self-efficacy plays a large role in behavior change. If someone doesn’t think they can do something they likely will not be able to, however when self-efficacy is increased the behavior change is more likely to occur and to be successful. If patients can remember a time they have been successful in the past they may believe they will be successful again in the future. Exploring why an individual doesn’t think he/she will be successful |
| Don’t see a benefit | **Being physically active doesn’t always give you an immediate benefit that you can see or feel, but it has a number of benefits for your health.** Being physically active decreases your risk of developing type 2 diabetes, high blood pressure, heart disease, and certain cancers. If you already have diabetes or high blood pressure being physically active can help manage these diseases meaning you need to be on less medications. Physical activity can also improve your mood and help with weight loss. For elderly patients – Being physically active can help to decrease your risk of falls. Physical activity also helps maintain your ability to live independently. | **Just like perceived barriers to action decrease an individual’s likelihood of making a behavior change perceived benefits of action increase the likelihood that a behavior change will occur (Pender, et al., 2011).** |

| Influences from peers is also likely to affect a behavior change. Helping the patient identify someone in their life who is already performing physical activity will be a positive influence on his/her ability to change behavior (Pender, et al., 2011). | |
Appendix J
Project Extension Plan

<table>
<thead>
<tr>
<th>Task</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Determine project lead</td>
<td>A project lead can help guide decisions regarding the project and help keep the implementation of this process moving smoothly. Throughout the implementation process the project lead could also provide reminders to staff and providers to assess PA and provide PA interventions during the office visit.</td>
</tr>
<tr>
<td>Choose Physical Activity (PA) questionnaire</td>
<td>General Practitioner’s Physical Activity Questionnaire (GPPAQ) is available free of charge from the United Kingdom’s Department of Health Website (<a href="https://www.gov.uk/government/publications/general-practice-physical-activity-questionnaire-gppaq">https://www.gov.uk/government/publications/general-practice-physical-activity-questionnaire-gppaq</a>). This is the questionnaire that was used for the trial project. If the questionnaire could be embedded into the electronic health record the screening would be easier to include in patient visits.</td>
</tr>
<tr>
<td>Determine what patients and what types of office visits PA screenings should be performed during</td>
<td>During the trial project only adult patients who were being seen for a chronic disease or wellness visit were included. These office visits included a larger focus on health promotion and disease prevention.</td>
</tr>
<tr>
<td>Determine where results of questionnaire should be charted in the electronic health record</td>
<td>During the trial project results were charted in the Exercise section of Social History. This section includes a four level drop down box of PA levels and a box where comments can be charted. When results are charted here results can be seen on the main screen of the patient profile.</td>
</tr>
<tr>
<td>Choose individual(s) to provide training to support staff and providers</td>
<td>Individuals performing the screening will need training regarding the use of the screening questionnaire, how to score the questionnaire, how to record the score, and the reason behind the use of the questionnaire. Providers will require training regarding the result of the questionnaire and available PA interventions.</td>
</tr>
<tr>
<td>Determine start date of project</td>
<td></td>
</tr>
<tr>
<td>Task</td>
<td>Details</td>
</tr>
<tr>
<td>---------------------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Provide training to the individuals who will perform the screening</td>
<td>Training for the use of the GPPAQ can be found in Appendix H and could be used as the basis for this training.</td>
</tr>
<tr>
<td>Provide training to providers regarding how to discuss PA with patients</td>
<td>The Health Promotion Model (HPM) can be used as a basis for conversations in relation to PA with patients. Examples of the use of this model is included in Appendix I. Perceived benefits of action, perceived barriers to action, prior related affect, peer influence, and self-efficacy are important elements of the model in relation to PA.</td>
</tr>
<tr>
<td>Provide training about available PA interventions</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- PA counseling based on the HPM</td>
</tr>
<tr>
<td></td>
<td>- PA education found in education materials already embedded into the HER</td>
</tr>
<tr>
<td></td>
<td>- PA prescription – the Kent County Health Department already has prescription forms made up and are willing to work with a local primary care office to implement their use</td>
</tr>
<tr>
<td></td>
<td>- Referral – if the patient’s barrier to action appears to be access to areas to perform PA referral to the community health worker for help finding available community resources will be helpful</td>
</tr>
<tr>
<td>Consider assessing readiness for change before providing PA intervention</td>
<td>PA readiness to change could be assessed to help determine what type of intervention is appropriate. If a patient is in pre-contemplation a referral or prescription may not be appropriate. Readiness to change could be assessed using the Physical Activity Stages of Change Measure (Pekmezi et al., 2010).</td>
</tr>
<tr>
<td>Provide reminders of project implementation start date to staff and providers</td>
<td></td>
</tr>
<tr>
<td>During rooming process medical assistants and licensed practical nurses perform PA questionnaire</td>
<td></td>
</tr>
<tr>
<td>Results of questionnaire are charted in electronic health record</td>
<td></td>
</tr>
<tr>
<td>Provider looks at PA level and provides PA intervention if appropriate</td>
<td></td>
</tr>
<tr>
<td>Intervention is performed and charted in discharge summary</td>
<td></td>
</tr>
</tbody>
</table>
Project lead can help provide reminders of interventions and help to track if interventions are occurring.

If students are working at the office they may be useful in tracking interventions and providing reminders.

This will help ensure the screenings and interventions are being done until the process becomes more routine.
References


cardiac structure and vascular function in young and middle-aged adults. *Journal of the American Heart Association, 4*. doi:10.1161/JAHA.114.001528


