PROMOTING SELF-CARE THROUGH EXERCISE IN PATIENTS WITH TYPE 2 DIABETES MELLITUS

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A project submitted to the faculty at the University of North Carolina at Chapel Hill in partial fulfillment of the requirements for the degree of Doctor of Nursing Practice in the Doctor of Nursing Practice Program in the School of Nursing.

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ABSTRACT

Rebecca A. Dillen: Promoting Self-Care Through Exercise in Patients with Type 2 Diabetes Mellitus
(Under the direction of Carrie F. Palmer)

Regular exercise provides substantial health benefits to people diagnosed with type 2 diabetes mellitus. Benefits of regular exercise for these patients include better control of their chronic illness, decreased body mass index, reduced chronic effects of the disease, and decreased cardiovascular risk factors. Although physical activity is proven to be a necessary cornerstone of care for the prevention and treatment of this disease, education and support of patients is lacking for this intervention. The goal of this project was to design, implement, and evaluate an intervention targeting patient motivation and willingness to engage in self-care related to exercise.
ACKNOWLEDGEMENTS

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I am extremely grateful to my parents, Bill and Teri Dillen, for their constant love, prayers, care, and sacrifice to raise and educate me, and to gracefully prepare me for my future and this accomplishment. I am also thankful to my brother and sister for their support along this journey. I want to express my thanks to Jennifer Ward, a mentor and friend, for her continued support, prayers, and “checking in” on me throughout my research, and for always sending me relevant and current research and suggestions.

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CHAPTER 1: INTRODUCTION

Background and Significance

Obesity is proven to be the greatest contributing factor to type 2 diabetes, with an estimated 60-90% of the cases being directly related to increased weight (Copeland, Crank, Hall & Millbourn, 2010; Pipe-Thomas & Storey, 2013). The prevalence of obesity is increasing drastically worldwide, with more than 1/3 of adults in the U.S. alone reaching the diagnosis of obesity (Adult Obesity Facts, 2015). Common causes of type 2 diabetes and obesity are found in a society that is increasingly more sedentary (Pipe-Thomas & Storey, 2013).

Clinical guidelines and evidence-based research regarding the prevention and treatment of type 2 diabetes address physical activity as a cornerstone of prevention and care in these individuals (Hansen, Dendale, van Loon, & Meeusen, 2010); however, education regarding exercise as a primary prevention strategy is lacking effectiveness. Among overweight individuals with a diagnosis of type 2 diabetes, there is a lack of understanding of the value of exercise to independently manage the disease process, and individuals do not believe in their ability to manage their disease (Annesi and Tennant, 2012).

Project Purpose

The purpose of this project is to identify if a brief educational session targeting self-efficacy and goal-setting as a way to improve exercise participation, as well as bi-monthly telephone reinforcement calls, will lead to an increase in exercise and/or a decrease in hemoglobin A1c (HbA1c) in individuals with type 2 diabetes mellitus. Specifically, this project aims to address the following questions:
1. Will a physical activity consultation based on the personalized CHART report, followed by bi-monthly telephone reinforcement calls, for patients with type 2 diabetes regarding self-care and encouragement for their ability to exercise, increase participation in exercise?

2. Will this intervention decrease HbA1c and body mass index (BMI) in the population studied?

3. What are the challenges when implementing a self-care intervention for patients with type 2 diabetes?
CHAPTER 2: REVIEW OF LITERATURE

Introduction to Type 2 Diabetes in the U.S.

The number of Americans with type 2 diabetes is expected to nearly double by the year 2030 from 18.2 million to 30.3 million (Davidson & Hamdy, 2007). Secondary to the drastic rise in patients with type 2 diabetes, and the association with body mass, the American Diabetes Association (ADA) and the National Institute of Diabetes and Digestive and Kidney Diseases recommend increased screening for all overweight and obese individuals aged 45 and older (Davidson & Hamdy, 2007). Overweight is determined by a BMI greater than 25kg/m$^2$, while obesity is a BMI greater than 30kg/m$^2$ (Adult Obesity Facts, 2015). The goal of screening is to identify those with prediabetes before progression to macrovascular complications and complete diabetes (Davidson & Hamdy, 2007). However, once the progression is imminent, discovering ways to reduce further damage is equally important for many reasons, including the dangers of cardiovascular risk factors associated with conversion to type 2 diabetes (Davidson & Hamdy, 2007).

Negative Physiological and Psychological Consequences of Overweight and Obesity

Acquiring an understanding for the negative physiological and psychological consequences of overweight and obesity is necessary for developing a strategy to approach patients. Research demonstrates that being just 10 to 20 pounds overweight can prompt type 2 diabetes (Colberg et al., 2010; Davidson & Hamdy, 2007). This increased weight, especially around the abdomen, leads to poor glycemic control (Copeland, Crank, Hall & Millbourn, 2010; Gallagher et al., 2012; Pipe-Thomas & Storey, 2013) through increased insulin resistance and β-
cell dysfunction, which are factors that lead to type 2 diabetes (Copeland, Crank, Hall & Millbourn, 2010). In addition, it is significant to note that those with insulin resistance have two to three times the risk for coronary artery disease than the normoglycemic population (Davidson & Hamdy, 2007). All of these factors relating to overweight and obesity from the perspective of diabetes strengthen the case for prevention and education in diabetes care.

**Impact of Inactivity on Diabetes**

With a progression towards inactivity among the population, there has been a rise in type 2 diabetes, emphasizing the importance of exercise to manage weight (Copeland, Crank, Hall & Millbourn, 2010; Pipe-Thomas & Storey, 2013). Sedentary lifestyles are more popular, and even promoted, with an estimated 40% of adults getting little to no physical activity daily (Turner, Thomas, Wagner & Moseley, 2008). Many research studies show that simple lifestyle changes, such as exercising at a moderate intensity for at least 30 minutes per day at least five days out of the week, can decrease the risk of people with pre-diabetes developing diabetes by 58% (Davidson & Hamdy, 2007).

**Education for Exercise to Treat Diabetes**

Although physical activity should be the foundation for the prevention and treatment of type 2 diabetes, education regarding exercise as a primary treatment is lacking effectiveness (Colberg et al., 2010; Copeland, Crank, Hall & Millbourn, 2010; Gallagher et al., 2012; Gulve, 2008; Hansen, Dendale, van Loon, & Meeusen, 2010; McNeilly et al., 2010). Individuals with diabetes tend to place a disproportionate reliance on the provider for management of their disease, without recognizing their ability to take control of their health through exercise and healthier lifestyle behaviors (Gallagher et al., 2012). Research reports show that patients place
the greatest belief in the effectiveness of medicine to control their diabetes, and the lowest belief in the effectiveness of physical activity (Kirk & Mutrie, 2007).

Low self-efficacy, based on the Social Cognitive Theory (SCT), is the leading factor in an individual’s lack of participation in their health through physical activity (Annesi & Tennant, 2013; Gallagher et al., 2012; French, Olander, Chisholm & Sherry, 2014). Studies find that improving patient’s participation in exercise and self-care programs should be adapted to improve self-regulation, mood, and self-efficacy in order to be more effective (Annesi & Tennant, 2013). In addition, focusing on simple short-term goal setting, incremental progress, and acknowledgement and encouragement of improvements has been associated with a greater sense of self-efficacy among individuals in relation to exercise and diet modifying programs (Annesi & Tennant, 2013).

**Treatment Goals for Type 2 Diabetes**

The treatment goals of type 2 diabetes include achieving and maintaining stable blood glucose control, lipid levels, and blood pressure levels to prevent or delay chronic diabetic complications (Colberg et al., 2010). Multiple clinical trials and research publications prove that physical activity has numerous benefits related to preventing diagnosis or reducing chronic effects of type 2 diabetes (Colberg et al., 2010; Copeland, Crank, Hall & Millbourn, 2010; Evert & Riddell, 2015; Gallagher et al., 2012; McNeilly et al., 2010; Sluik et al., 2012). Exercise leads to normoglycemic levels due to the utilization of glucose during and after exercise, and employs the use of insulin to initiate the transport of glucose into muscles that have exercised, which proceeds for hours after exercising (Gulve, 2008). Blood glucose control can additionally be achieved through proper nutrition and losing weight, along with other self-care behaviors, as well as taking oral medications. Preventing the progression to the need for insulin is a goal of
diabetes management plans (Colberg et al., 2010). Medications should be used as a way to support lifestyle changes that the patient is making, not as a replacement for self-management (Colberg et al., 2010). In addition, obesity increases insulin resistance and the body’s ability to manage glucose, which makes achieving blood glucose control more difficult, even through pharmacologic measures (Evert & Riddell, 2015).

**Standard Recommendations for Exercise**

Depending on study length, moderate-level exercise meeting standard recommendations has the possibility of lowering both HbA1c and BMI (Gulve, 2008; McNeilly et al., 2010). A standard recommendation of at least 150 minutes each week, or 30 minutes a day, five days per week, of moderate-intensity activity, as well as two days of strength training, has been shown to reduce cardiovascular risk factors and improve glycemic control (Caple & Schub, 2015; Hansen, Dendale, van Loon, & Meeusen, 2010). Walking is often considered a moderate-intensity exercise for previously sedentary patients with diabetes because it does not require a facility with equipment, it can be easily accomplished throughout the patient’s daily routine, and it is a reasonably safe activity for most (McNeilly et al., 2010; Sluik et al., 2012). However, studies in patients with diabetes show that adding resistance training, two to three times weekly for 10 to 12 weeks, can improve blood glucose levels, and significantly lower the HbA1c levels (Colberg et al., 2010). This is thought to be secondary to an increase in muscle mass that contributes to the uptake of glucose (Colberg et al., 2010). Nonetheless, one study showed that a 12-week intervention of brisk walking in a previously sedentary population exhibited marked reductions in body mass, body fat, as well as systolic blood pressure (McNeilly et al., 2010). The American College of Sports Medicine and the ADA’s current recommendations include aerobic as well as resistance training in the treatment of diabetes (Gulve, 2008). Aerobic exercise has the benefit of
additional heart and vascular protective measures, while resistance training demonstrates improvement in age-related deterioration related to bone health and arthritis (Gulve, 2008).

It is most beneficial to introduce exercise into the glycemic control management plan prior to extensive loss of β-cell function and sizeable weight gain requiring multidrug pharmacotherapy (Evert & Riddell, 2015). Due to the structure of exercise, it is possible to prescribe a “therapeutic dose” for individual patients based on their goals (Evert & Riddell, 2015). This prescription can include the recommended type, intensity, duration and frequency of exercise. Aerobic exercise includes walking, bicycling, or jogging, while resistance exercise includes repetitive physical activity with weights, weight machines, resistance bands, or the patient’s own body weight to increase the strength of specific muscle groups (Evert & Riddell, 2015). Based on the recommendations of the American College of Sports Medicine and the ADA, brisk walking on level ground or cycling is favored among overweight and obese individuals with joint pain (Evert & Riddell, 2015).

**The Use of Education to Bridge the Practice Gap**

One of the most important aspects of diabetes care, because it is one of the most common self-care diseases, is patient education. Compliance with recommended physical activity is often low, regardless of the patients understanding of the benefits to their health (Evert & Riddell, 2015). Over the past three and a half decades, education in diabetes care has been continuously improved and modified to find an approach that is most effective for the patient (Wu, Tung, Liang, Lee & Yu, 2014). Traditionally, the provider acted as an expert, telling the patient what to do and how to achieve specific goals. In the 1990’s, empowerment was seen as an important approach in that the provider encourages expression of feelings to discover barriers and concerns of the patient, then solutions are approached and developed (Wu, Tung, Liang, Lee & Yu, 2014).
In this method, the provider takes on more of a counselor role, enabling the patient to have more motivation and greater involvement in their health (Wu, Tung, Liang, Lee & Yu, 2014). A major limitation to exercise interventional programs is the significant dropout rate, with fewer than 40% of patients maintaining both aerobic and resistance training goals after the interventional program is completed (Evert & Riddell, 2015). Although many studies prove physical activity as a cornerstone of type 2 diabetes management, barriers to engaging in self-care exist secondary to behavioral and psychological factors.

Maintaining engagement in a physical activity routine remains the biggest challenge in diabetes management (Nam, Dobrosielski & Stewart, 2013) and can be addressed through improving self-efficacy. The enhancement of perceived self-efficacy is an additional goal that is important to achieve in diabetic care and education (Anderson, Funnell, Fitzgerald & Marrero, 2000). An intervention focusing on increasing the patient’s recognition of their ability to have control over their health through increased self-efficacy, with a plan to modify behaviors that are ineffective, replacing them with self-monitoring and awareness is reflective of the SCT (Annesi & Tennant, 2013). Health behavior change interventional programs often look to the SCT as a basis for promoting individual’s positive view and expectations of behavior change (Anderson-Bill, Winett & Wojcik, 2011). Research demonstrates that an increased level of self-efficacy in expectations that the outcome of a behavior change will be positive, leads to patients using skills provided to improve behavior and health (Anderson-Bill, Winett & Wojcik, 2011). An increased use of these self-regulatory skills can have a significant impact on physical activity.

In addition, research has shown that patients feeling supported can improve adherence to exercise intervention programs (Kirk & Leese, 2009). A method to support patients throughout an interventional program is to contact them via telephone. This provides for an on-going review
of action plans set forth by the patient, which keeps exercise at the forefront of their day-to-day planning (Goode et al., 2011).

Summary

Overweight and obesity, fostered in a sedentary lifestyle, contribute considerably to type 2 diabetes and negative outcomes related to the disease. Physical activity is a recognized cornerstone of prevention and care in these individuals; however, patients do not appreciate their self-management capabilities. Self-efficacy is a crucial part of exercise adherence in this population of individuals, and improvement could possibly lead to increased implementation of self-care practices. Educating individuals with diabetes on the benefits of exercise, and their ability to achieve these benefits, as well as providing them with tools and motivation to do so, is an essential aspect of primary care.
CHAPTER 3: CONCEPTUAL AND THEORETICAL FRAMEWORK

The Social Cognitive Theory History and Overview

The Social Cognitive Theory is an explanatory model developed by Albert Bandura to conceptualize the causal structure relating to human functioning. This theory proposes that human functioning is a product of multiple factors that act as one, including intrapersonal, behavioral and environmental determinants (Lange & Kruglanski, 2011). It originated as a psychology-based theory to explain the human ability to “regulate their own functioning and shape the course of their lives” (Lange & Kruglanski, 2011). The goal of Bandura’s research is the focus on human development, adaptation and change (Lange & Kruglanski, 2011). Although external to nursing, the SCT is frequently used in nursing due to its focus on behavior modification through increases in self-efficacy, which is especially important for health behavior changes (Sturt, Whitlock & Hearnshaw, 2006). An intervention focusing on increasing the patient’s recognition of their ability to have control over their health through increased self-efficacy, with a plan to modify behaviors that are ineffective, replacing them with self-monitoring and awareness is reflective of the SCT (Annesi & Tennant, 2013).

A recurring theme patients express in relation to managing their health is related to confidence in their ability to manage their disease (Annesi & Whitaker, 2010; Wu & Chang, 2014). In relation to this confidence, Bandura proposes through his theory that “unless people believe they can produce desired effects by their actions, they have little incentive to act or persevere” (Bandura, 2004). The key concept of the SCT is the idea of self-efficacy, which is directly related to confidence in ability to change behaviors independently (Wu & Chang, 2014).
The three concepts of this theory, intrapersonal, behavioral and environmental, operate in a “triadic reciprocal causation,” which, as defined by Bandura, is an interplay between the three concepts which leads to influencing and being influenced by each other at the same time (Lange & Kruglanski, 2011). The lagging of time between interactions of the concepts creates time for clarification of functions. For example, how a person interprets the results of their behavior can alter their environment and personal factors, which will alter future behaviors.

**Application of the Social Cognitive Theory**

Secondary to the reciprocal nature of the elements of this theory, counseling for behavior change can be aimed at any of the three factors of the theory, which is beneficial in applying the model to practice. The SCT presented a different way of assessing human behavior in a time when self, or inner, processes were not seen as important to other theorists (Wu & Chang, 2014). Bandura, however, recognized that without an understanding for the inner thoughts and processing of external, or environmental, stimuli, one cannot understand the complexity of human functioning (Bandura, 1977). The SCT is rooted in the idea of human agency, which proposes that people are actively involved in their development, or in change, and can make adjustments through their actions. Bandura also recognized that making changes to behaviors could happen through groups with shared beliefs, which inspires many studies to promote group processes to change behavior (Wu & Chang, 2014).

Health behavior change interventional programs often look to the SCT as a basis for promoting individual’s positive view and expectations of behavior change (Anderson-Bill, Winett & Wojcik, 2011). Research demonstrates that an increased level of self-efficacy in expectations that the outcome of a behavior change will be positive leads to patients using skills
provided to improve behavior and health (Anderson-Bill, Winett & Wojcik, 2011). An increased use of these self-regulatory skills can have a significant impact on physical activity.

More recent research focuses on the experience of a patient undergoing lifestyle modification treatment, and exploration of how changes happen (Ljung, Olsson, Rask, & Lindahl, 2013). Primary prevention of type 2 diabetes has looked to behavior modification as the standard for lifestyle interventions. Encouragement and support of the changes for the patients, as well as practical training on exercise interventions is a necessary part of behavioral change programs. An important aspect to consider in regard to the patient’s interpretation of a lifestyle intervention involves self-development and an understanding of their own responsibility for their health (Ljung, Olsson, Rask & Lindahl, 2013). Teaching self-reflection and self-monitoring of past behaviors, as well as future successes, enables one to recognize their specific needs in order to construct more long-term changes. This makes an intervention more personalized, due to every participant’s obstacles being different (Ljung, Olsson, Rask & Lindahl, 2013). An important aspect of an interventional program is for the participants to adopt a feeling of active contribution to the outcome, rather than passive reciprocation.

Studies reveal several aspects of behavior change that are necessary for patients in need of this type of intervention. Emotions including stress, shame and frustration are often reported as preventative to long-term lifestyle changes (Ljung, Olsson, Rask & Lindahl, 2013). Therefore, education on managing these emotions is necessary to include in the program to possibly aid in the ability to overcome such negative thoughts (Ljung, Olsson, Rask & Lindahl, 2013). In addition, practical tools or self-regulatory behaviors such as planning, self-monitoring, problem solving, assessing self-standards, goal setting and self-incentives are useful to assist in maintenance of behavior change (Anderson-Bill, Winett & Wojcik 2011). These tools offer a
mode through which patients can learn to manage their lifestyle changes independently, with a greater sense of self-efficacy (Ljung, Olsson, Rask & Lindahl, 2013).

If a platform through which to set goals, plan, track, and provide feedback to patients is provided, patients may feel more supported and capable of achieving desired health outcomes (Anderson-Bill, Winett & Wojcik, 2011). Providing this platform of unbiased support and tools for success will strengthen self-efficacy (Bandura, 1977). Bandura promotes the existence of four components that maintain and develop this platform of self-efficacy in individuals. These components are performance accomplishments or mastery experiences, vicarious experiences, verbal or social persuasion, and physiological, or somatic and emotional states (Bandura, 1977). Mastery experiences include an improved confidence once the realization of capability is discovered in an individual, and positive results are observed. Vicarious experiences are representative of observing others through social models. Verbal or social persuasion is present through a positive reaction to encouragement by healthcare providers, which also increases confidence in capabilities. And lastly, physiological or emotional states are a critical focus of interventions. Emotional support from the provider to promote trust is essential for the patients to feel supported. Advocating an atmosphere of positivity without judgment is vital to eliminate any feelings of shame or embarrassment for needing treatment (Ljung, Olsson, Rask & Lindahl, 2013). All of the components lead to increased self-efficacy, the key factor in a long-term behavioral modification to treat type 2 diabetes.

**Defense of Theory and Limitations**

Application of a theory to an interventional project is necessary for many purposes, with one being the ability to repeat testing in similar and different settings to develop an understanding of the successes and failures in one setting verses another (Ljung, Olsson, &
The purpose of the Doctor of Nursing Practice (DNP) scholarly project is to help build a bridge between research and practice, as well as theory and practice (Moran, Burson & Conrad, 2014). The project is meant to improve healthcare, while being just the beginning of future scholarly contributions to the nursing and medicine field (Moran, Burson & Conrad, 2014). By using a theory, in this case the SCT, one can study the mechanisms behind behavioral change, while being able to re-test the same intervention in a different setting with a different population in the future in order to test success (Ljung, Olsson, Rask & Lindahl, 2013). Theories are developed from past successes and failures, thus applying a theoretical framework used in similar previous studies decreases the possibility of failures (Sirur, Richardson, Wishart & Hanna, 2009). Limitations of the theory and application of it include the need to have patients self-report several aspects of the behavior, measurement issues, such as how to measure emotions and thoughts, and inconsistency in the ability to provide social support to patients that may not have adequate support outside of the provider’s office (Plotnikoff, Lippke, Courneya, Birkett & Sigal, 2008).

Application of the SCT is wide-ranging, and can be conceptualized to understand or change behavior. Bandura proposes that self-efficacy, or what one believes they are capable of, is more of a determining factor of what they will do than what they are actually capable of (Bandura, 2004). This proposition fosters the need for increasing self-efficacy in the population to promote necessary change and recognition of ability in relation to exercise.
CHAPTER 4: METHODOLOGY

Project Design

Approval to conduct this project was obtained from the University of North Carolina’s Institutional Review Board (IRB) on June 18, 2016, with a modification approval on August 19, 2016. The IRB study number is 16-1305. The project was also approved through the research council within the Internal Medicine Clinic (IMC).

In order to evaluate the impact of an intervention targeting patient motivation, willingness, and engagement in self-care related to exercise, this three-month quality improvement study assessed each patient’s behavior using a unique online health behavior tool known as the Carolina Health Assessment and Resource Tool (CHART) (Carolina Collaborative for Research on Work and Health, 2016). This tool was utilized as a pre-interventional analysis to assess patient beliefs and behaviors prior to an individualized physical activity consultation with bi-monthly follow-up phone calls. This study evaluated the effectiveness of providing an improved, patient-specific consultation regarding exercise, while addressing the patient’s self-efficacy using motivation and realistic goal setting.

During all phases of the study, all data was collected and stored within Excel documents and the CHART tool on UNC’s CHAI Core (Communications Applications and Interventions) secure servers. The CHART tool was delivered via a laptop computer while the patient was waiting to see the provider during their scheduled diabetes care appointment, and the personalized report was generated, printed, and used to guide a personalized discussion of areas of improvement or a need for change in behavior. The patients were asked to complete only the
“Demographic” and “Your Physical Activity” modules. Instructions for how to use the program were given to the patient, with all questions answered prior to beginning the modules. Using the personalized report, the principal investigator (PI) conducted a personalized consultation lasting approximately 30 minutes, which addressed areas impeding the patients from meeting recommended guidelines for exercise, and assisted the patient to set walking goals that were short term (one-month), intermediate (three-month), and long term (six-month). These goals were specific, measureable, action-based, realistic and time-lined (SMART). The patient’s individual and self-created goals were hand-written on their personalized report that they took home, and documented in the patient’s chart in the electronic medical record (EMR) for reference during calls that were made to the patients every two weeks. The format of the goals was as follows: By ___ month(s), I plan to be walking ___ minutes per day, ___ times per week. These goals were set for three different times: one-month, three-months and six-months. The study was completed at three-months when the patient returned to the clinic for their follow-up appointment, but the six-month goal was set to encourage sustainability and continuation of the goal.

**Study Question**

This project aimed to address the following question:

1. Will a physical activity consultation based on the personalized CHART report, followed by bi-monthly telephone reinforcement calls for patients with type 2 diabetes regarding self-care, and encouragement for their ability to exercise, increase participation in exercise, and decrease HbA1c and/or BMI?
Setting

This DNP project took place in the IMC of the Ambulatory Care Clinic (ACC) at the University of North Carolina Hospital. The IMC offers outpatient service for adults, over the age of 18, and is a division of UNC Health Care Department of Medicine, which aspires to be the nations leading internal medicine practice. The clinic offers medical services, disease management programs, and on-site radiology, pharmacy and laboratory services (Division of General Medicine and Clinical Epidemiology, 2015). The practice ventures to provide care through a team approach involving a medical director, physicians, nurses, administrative staff, clinical pharmacists, care assistants, nutritionists, physician assistants and nurse practitioners, to improve patient care at each visit. The team members are primary stakeholders in any research that takes place within the facility.

Participant Recruitment

The IMC provides care for a variety of patients of varying ethnicities, ages, backgrounds and socioeconomic class. Study participants were recruited from the clinic based on meeting various eligibility criteria. Participant recruitment was primarily based on presentation to clinic on days when the PI was present and available to see patients, and sample size was based on convenience and availability during the two-month recruitment span. Patients were informed about the purpose of the project upon arrival for their regularly scheduled diabetes care appointment, and given a copy of the Informed Consent form, as well as the Health Insurance Portability and Accountability Act (HIPAA). They were guaranteed that participation was voluntary, and that refusing participation would not impact the care provided at the clinic. Patients were informed that all data compiled during the study would be stored securely by the clinic and PI. Patients then signed an informed consent and the HIPAA form, were given copies
of each, and agreed to return to the clinic in three months for follow up. All patient privacy was maintained. A copy of the consent form can be found in Appendix A, as well as the HIPPA form in Appendix B.

The convenience sample consisted of 15 study participants of diverse backgrounds and ethnicities who sought care at the clinic, and were identified by their provider as being in need of intervention. Eligibility criteria included patients diagnosed with type 2 diabetes with a HbA1c greater than 7.5%, 18 years of age or older, English-speaking, had a working telephone, and expressed willingness to return to the clinic in three months for their follow-up appointment. See Table 1 for demographic information.

Table 1. Participant Demographics (n = 15)

<table>
<thead>
<tr>
<th>Marital Status</th>
<th>Participant Distribution</th>
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<td>Married</td>
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<tr>
<td>Divorced</td>
<td>4</td>
</tr>
<tr>
<td>Never Married</td>
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<td>Widowed</td>
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<tr>
<td>Separated</td>
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<tr>
<td>Unmarried Couple</td>
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<table>
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<tr>
<th>Race</th>
<th>Participant Distribution</th>
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<td>White</td>
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<td>Black/African American</td>
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<td>Other (Puerto Rican)</td>
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<table>
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<th>Education</th>
<th>Participant Distribution</th>
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<td>High School Graduate</td>
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<tr>
<td>Some College or Tech School</td>
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<td>Retired</td>
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<tr>
<td>Unable to Work</td>
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</tr>
</tbody>
</table>
Health Insurance | Participant Distribution
--- | ---
Medicare | 6
Medicaid | 5
State-Sponsored Health Plan | 4

**Project Variables**

The variables were selected based on clinical guidelines for measuring changes in diabetes management, and guidelines to measure overweight and obesity. Modest weight loss in overweight and obese patients, defined as a decrease of initial body weight by 5%, has been shown to improve glycemic control, and to decrease the need for diabetic medications (American Diabetes Association, 2017). Thus, measuring the BMI of these patients was a significant indicator of diabetes management, and is recommended as a standard of care by the ADA (2017). In addition, measuring the total minutes of exercise per week was important due to the ADA recommendation of 150 minutes of moderate-intensity aerobic exercise per week for adult patients with diabetes (American Diabetes Association, 2017). Physical activity is defined as all movement that increases energy use; therefore, walking is considered a practical way for increasing physical activity.

The HbA1c reflects the average blood sugars over approximately three months (American Diabetes Association, 2017), thus measuring this test initially, and subsequent to the intervention, was an important demonstration of effectiveness. A goal of an HbA1c less than 7% is reasonable for non-pregnant adults, and is the goal for patients with type 2 diabetes (American Diabetes Association, 2017).

**Tools**

Data and targets for individualized education were collected using the online CHART tool. The tool was originally developed as a core resource for the purpose of improving patient
awareness and motivation to modify behavioral risks, as well as to initiate interventions to reduce behavioral risk factors that patients exhibit.

The tool offers 10 behavior-specific modules that patients can complete on a computer, tablet, or on paper. The modules include “publicly accessible and tested questions and corresponding evidence-based, theory-guided message libraries” (Carolina Collaborative for Research on Work and Health, 2016). The modules are adaptable to be chosen independently for use in specific projects. For this project, the modules used were “Demographics” and “Your Physical Activity”. A copy of the modules can be found in Appendix C and Appendix D. The tool creates personalized reports for each patient based on their responses. The reports include a graphic representation of current behavior compared to recommended guidelines, and theory-guided recommendations for behavior change (Carolina Collaborative for Research on Work and Health, 2016).

**Implementation Plan and Procedures**

A task force that included the PI, a nurse practitioner, a pharmacist, and four care assistants was formed within the clinic. The project goals were explained to each individual member of the task force, along with the expected proceedings of the project. Members of the task force were informed about the CHART tool, and how it would be used to direct the project, as each patient would have unique needs.

Each study participant was contacted bi-monthly via telephone, one call was performed by the care assistants, the other by the PI. Phone calls were approached in a methodological way using a telephone script, with individual questions answered during phone calls, and encouragement provided based on patient responses. Phone calls lasted approximately 30 minutes, and assessed the patient’s self-efficacy and perception of how they were meeting their
goals. A smart phrase telephone script was developed within the EMR to assist documentation of phone calls by the care assistants. The telephone script can be found in Appendix E.

Measures

Data Collection. Patients took the CHART assessment as a pre-interventional tool to assess patient need for education and motivation, which was completed during their scheduled appointment. The Carolina Collaborative for Research on Work and Health Study made data from this tool available to the PI in various formats (e.g. CSV, Excel). The data collected included demographic information of each patient, in addition to current exercise compared to the recommended guidelines. In addition, patients were asked to complete a seven-day physical activity recall during the initial appointment. This collection of data was used to assess patients’ aggregate mean increase in exercise following the three-month study period, where they would be asked for the same information. The amount of activity was converted into total number of minutes of exercise per week for ease of statistical computation.

Data Analysis

Descriptive statistics were collected during the patient’s scheduled diabetes care appointment via the CHART assessment. This data included age, race, sex, marital status, education level, health care coverage and employment status. Other pre- and post-intervention statistics collected by the PI included frequency of exercise as total number of minutes per week, HbA1c, and BMI. Hemoglobin A1c and BMI were collected via a chart review of the results of lab tests and vital signs collected during the patient’s visit.

Qualitative Analysis. Data collected during the consultation with the patients was organized in a Microsoft Excel document, with each patient identified by medical record number (MRN) for easy identification during post-implementation data collection. To determine if there
was a statistically significant change in HbA1c, BMI and/or number of minutes of exercise per week pre- and post-intervention, results were analyzed using a paired, 1-tail distribution t-test. A paired test was used because the same participants were studied pre- and post-intervention, and it was a 1-tailed distribution due to the measurement of impact being in one direction.
CHAPTER 5: RESULTS

Participation

For the pre-interventional survey, 15 patient charts were reviewed that met the inclusion criteria, and the primary provider was contacted to assess ability to participate in an exercise regimen. Of the 15 participants, six were male and nine were female. Nine out of the 15 participants completed the program, and returned to clinic to have their HbA1c and BMI checked. Of these nine participants, five were male and four were female.

Of the six patients that did not complete the program, the self-reported reasons for not meeting their goals included: doctor advising against walking, moving to a different state, changing primary care provider, and hospital admission for another ailment. In addition, the PI and care assistants were unable to reach two participants to schedule a follow-up appointment.

Challenges to Implementation

Patients were assessed for ability to exercise prior to enrollment in the program through several different methods, including a chart review, a conversation with the primary provider about the patient’s ability to participate, and lastly, a conversation face-to-face with the patient prior to the intervention. All patients originally enrolled in the program expressed enthusiasm for participation, and a willingness to return to have the post-implementation labs and BMI collected. Unforeseen obstacles, including changing primary care providers, hospital admission, and other illnesses prevented six of the participants from completing the study.
Adverse Events

There were no reported or documented adverse events that occurred secondary to this exercise intervention. There were no notes documented or communication to the PI or care assistants addressing any participant concerns, falls, hypoglycemic events, medical conditions or cardiac ailments that occurred during the interventional period secondary to increasing exercise participation.

Intervention Usability

Findings from post-implementation HbA1c, BMI, and patient report of exercise revealed that the intervention was successful for those who start and continue an exercise program. Table 2 includes the pre- and post-implementation data for HbA1c, BMI, and number of minutes of exercise per week, which was a self-reported statistic.

Table 2. Pre- and Post-Implementation Data

<table>
<thead>
<tr>
<th></th>
<th>Pre-HbA1c (%)</th>
<th>Post-HbA1c (%)</th>
<th>Pre-BMI (kg/m²)</th>
<th>Post-BMI (kg/m²)</th>
<th>Pre-Exercise (minutes)</th>
<th>Post-Exercise (minutes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient 1</td>
<td>8.8</td>
<td>8.4</td>
<td>38.8</td>
<td>37.95</td>
<td>120</td>
<td>225</td>
</tr>
<tr>
<td>Patient 2</td>
<td>7.7</td>
<td>7.1</td>
<td>32.1</td>
<td>32.54</td>
<td>0</td>
<td>180</td>
</tr>
<tr>
<td>Patient 3</td>
<td>8.9</td>
<td>8.6</td>
<td>28.7</td>
<td>28.51</td>
<td>0</td>
<td>150</td>
</tr>
<tr>
<td>Patient 4</td>
<td>8.6</td>
<td>7.7</td>
<td>32.2</td>
<td>32.01</td>
<td>45</td>
<td>120</td>
</tr>
<tr>
<td>Patient 5</td>
<td>14.1</td>
<td>8.4</td>
<td>33.27</td>
<td>32.28</td>
<td>0</td>
<td>150</td>
</tr>
<tr>
<td>Patient 6</td>
<td>8.6</td>
<td>7.1</td>
<td>30.02</td>
<td>30.19</td>
<td>0</td>
<td>180</td>
</tr>
<tr>
<td>Patient 7</td>
<td>14.0</td>
<td>13.0</td>
<td>38.0</td>
<td>36.93</td>
<td>0</td>
<td>300</td>
</tr>
<tr>
<td>Patient 8</td>
<td>8.7</td>
<td>8.9</td>
<td>37.42</td>
<td>37.04</td>
<td>0</td>
<td>75</td>
</tr>
<tr>
<td>Patient 9</td>
<td>11.2</td>
<td>10.9</td>
<td>48.59</td>
<td>47.15</td>
<td>0</td>
<td>105</td>
</tr>
<tr>
<td>Mean</td>
<td>10.067</td>
<td>8.9</td>
<td>35.45</td>
<td>34.95</td>
<td>18.3</td>
<td>165</td>
</tr>
</tbody>
</table>

Change in Results Following Intervention

A paired t-test was completed for nine patients who completed both the pre- and post-interventional requirements, and returned to clinic to have their HbA1c, BMI and exercise participation evaluated. These results are available in Table 3. During the three-month study,
participants’ aggregate mean HbA1c decreased from 10.067% to 8.9% (p = 0.042).

Additionally, BMI decreased by 0.5kg/m² (p = 0.021). Mean reported exercise minutes increased by 146.7 minutes (p = 0.00012). These analyses indicate the intervention had statistically significant, positive results on the outcomes measured.

Table 3. Paired t-test Results (n = 9)

<table>
<thead>
<tr>
<th></th>
<th>Mean for Pre</th>
<th>Mean for Post</th>
<th>Mean Difference</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>HbA1c</td>
<td>10.067%</td>
<td>8.9%</td>
<td>1.167%</td>
<td>0.042</td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>35.45</td>
<td>34.95</td>
<td>0.5</td>
<td>0.021</td>
</tr>
<tr>
<td>Exercise</td>
<td>18.33</td>
<td>165</td>
<td>-146.67</td>
<td>0.00012</td>
</tr>
<tr>
<td>(minutes)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Significance set at p < 0.05
CHAPTER 6: DISCUSSION

Theoretical Framework

The SCT, from which the idea of increasing self-efficacy for behavior change was acquired, was relevant to understanding and directing the course of this DNP project. Developing an understanding for the idea of self-efficacy, and the impact it has on patients adopting new skills and behaviors to improve their health, was essential. When meeting with patients individually and discussing their current involvement in any type of exercise routine, the PI found that all interviewed patients did not recognize exercise and self-care as a way to independently manage their diabetes. This was a finding that was anticipated during the project design based on the literature review. Providing education regarding the benefits of exercise, increasing recognition of patient ability to exercise and participate in self-care, and modification and replacement of ineffective behavior, was all key to the personalized exercise consultation. By creating a more positive view for the individual of themselves, and greater expectations for their behavior change, the intervention was able to increase individual self-efficacy.

In addition, patients were contacted via telephone every two weeks and provided with encouragement on their reported progress toward their goals, or, if they were not meeting their goals, they were motivated and empowered in their ability to increase their current exercise. The support of these patients throughout their self-care can be seen as a way to increase their participation and recognition of their ability to influence their personal health, and change behavior. In other words, their self-efficacy was targeted consistently throughout the three-month period.
**Intervention Usability**

In general, the patients that were included in the study were interested in learning more about exercise and the impact it could have on the course of their diabetes. The study aimed to address a problem seen in primary care, which is that patients are not provided with an adequate amount of education regarding self-care and exercise, as indicated by clinical guidelines and recommendations. This study and the results prove the effectiveness of greater education and motivation for these patients, however, the population and setting studied was specific and not replicable. In addition, the dropout rate of 40% was rather significant, thus the results can only be correlated with patients that agree to begin, and also complete, an exercise program.

Although a small sample size, the results are significant considering the limitation that was present for other variables that can impact studies that utilize a control group and a study group. This study looked at the same individual patients pre- and post-intervention, which controls for all extraneous circumstances for each participant, and creates greater statistical power.

**Limitations of the Study**

No study is without limitation. This study was completed at a single internal medicine clinic, which is part of an academic medical center, thus generalizability is limited. The study included a small convenience sample size, starting with 15 participants, and finishing with nine participants. Six participants withdrew from the study for individual reasons stated previously. A larger sample size would strengthen the findings. With regard to the bi-monthly telephone calls, consistency was not manageable. Participants could not always be reached, and reasons for being unreachable were unknown. Other possible confounders to the study results included factors outside of the study intervention, such as family support of patient goals, medication and
nutrition capabilities, and transportation to and from clinic appointments. Other changes to the patients’ care or other health maintenance could have also contributed to changes in post-HbA1c, such as medication compliance or adjustments, diet changes, and/or other illnesses impacting ability to maintain and meet exercise goals.

An experimental design using a control group could allow for control of other variables to determine whether or not the exercise intervention truly was the cause of the statistically significant changes. Using a control group of patients who did not have medication adjustments, did not have the personalized exercise consultation, and/or did not have the bi-monthly telephone calls would have demonstrated which variable truly influenced the outcome. Secondary to standards of care for diabetes, it would have been unethical to only attempt to improve the care of certain patients within the study.

**Recommendations for Future Research**

The goal for future research in exercise interventions for patients with type 2 diabetes would benefit from having a focus on the adherence to goals and treatment. Exercise training research trials have a drop out rate as high as 50% during intervention, even when participation is voluntary (Nam, Dobrosielski, & Stewart, 2012). Factors contributing to a greater risk for dropout in these individuals includes lower self-efficacy, lower fitness level, higher total body fat, and higher subcutaneous abdominal fat (Nam, Dobrosielski, & Stewart, 2012). Future research looking at exercise interventions for these patients should include a component focusing on diet and nutrition as well, considering that dietary modifications would contribute significantly to weight and fat loss, and thus adherence to exercise (Dalle Grave, Calugi, Centis, El Ghoch, & Marchesini, 2010). Another part of the initial assessment should include a standard survey that evaluates self-efficacy, such as the Exercise Self-Efficacy Scale (ExSE) (Annesi,
otherwise, the CHART tool utilized for this study could be used to evaluate the impact of additional variables on the results, such as the answers of participants on the physical activity module, and how they correlated with the results. For future research, a greater number of initial participants could be enrolled in the study to account for those that do not complete the three-month interventional period.

**Conclusion**

The management of type 2 diabetes requires a multifaceted approach to prevent acute complications, and reduce the risk of long-term negative outcomes related to the disease. This study demonstrates the importance of addressing self-care measures with patients during their primary care appointments, as well as assessing the perception patients have for their ability to impact their health. Utilizing Bandura’s SCT as a way to improve patient participation in their health is a method that is supported considerably in the literature. By providing a more thorough educational session that is personalized to the specific needs of each patient, a provider can expand and enhance the care provided, as well as improve clinical outcomes for patients with type 2 diabetes.
APPENDIX A: INFORMED CONSENT

Consent Form Version Date: 2016
IRB Study # 16-1305
Title of Study: Promoting Self-Care Through Exercise in Patients with Type 2 Diabetes
Principal Investigator: Rebecca Dillen
Principal Investigator Department: School of Nursing
Principal Investigator Phone number: (814) 823-2629
Principal Investigator Email Address: rdillen7@unc.edu
Faculty Advisor: Carrie Palmer
Faculty Advisor Contact Information: (919) 966-5480

We invite you to take part in a research study. Please take as much time as you need to read the consent form. If you find any of the language difficult to understand, please ask questions. If you decide to participate, you will be asked to sign this form.

WHY IS THIS STUDY BEING DONE?

This study is about finding what keeps people with type 2 diabetes from exercising, and helping those people to learn how to exercise to gain better control over their blood sugar. We hope to learn if we can help you to control your diabetes better by spending more time teaching you about the importance of exercise, and how it can lower the chances of you having bad side effects from your diabetes. You are invited as a possible participant because you have type 2 diabetes, you are a patient at UNC Internal Medicine, and you may or may not be enrolled in the Chronic Care Management program. About 30 participants will take part in the study.

WHAT IS INVOLVED IN THE STUDY?

We will be asking you to take a survey with two parts. One is about who you are and different details about you (demographics), and the other is about the amount of exercise or physical activity that you usually do.
After you take this survey, a member of the research team will discuss your results with you. We will look over what is keeping you from exercising, and talk about how to increase your exercise. We will then set goals for you to help you meet the recommended amount of exercise. You will be contacted by phone twice per month via phone to see if you are meeting your goals, and to encourage you. In about 3 months, you will return to the clinic to see if you improved on your exercise, and we will see if your weight and/or hemoglobin A1C have decreased.

If you decide to take part, this is what will happen: You will take the survey on a tablet, and the results will be printed for you to take home with you following your appointment.

WHAT ARE THE POSSIBLE RISKS AND DISCOMFORTS?
In general, the benefits of regular physical activity far outweigh risks to the heart and lungs.

Rarely, heart problems occur as a result of physical activity. Examples of these problems include arrhythmias, sudden cardiac arrest, and heart attack. These events generally happen to people who already have heart conditions.

For middle-aged and older adults, the risk of heart problems due to physical activity is related to coronary heart disease (CHD). People who have CHD are more likely to have a heart attack when they’re exercising vigorously than when they’re not.

The risk of heart problems due to physical activity is related to your fitness level and the intensity of the activity you’re doing. For example, someone who isn’t physically fit is at higher risk for a heart attack during vigorous activity than a person who is physically fit.


**WILL YOUR INFORMATION BE KEPT PRIVATE?**

All data compiled during the study will be stored securely by the clinic and researchers. All patient privacy will be maintained.

**WHAT ARE THE POSSIBLE BENEFITS OF TAKING PART IN THIS STUDY?**

The possible benefits to you for taking part in this study may include better control of your blood sugars and diabetes, and a possible reduction in the amount of medicine you are taking for your diabetes. There is also the chance for weight loss. In addition, you will not be charged any additional fees for the extra education and information you will be receiving.

**WHAT ARE YOUR RIGHTS AS A PARTICIPANT, AND WHAT WILL HAPPEN IF YOU DECIDE NOT TO PARTICIPATE?**

Participation is voluntary, thus refusing participation will not impact your care provided by the clinic. You may stop participating in the study at any time.

I have carefully read the information contained above and I understand fully my participation as a subject in this study.

Date: _______________    Time: _______________

Signature: ______________________________

(Research Participant)
APPENDIX B: HIPAA AUTHORIZATION FORM

University of North Carolina at Chapel Hill

HIPAA Authorization for Use and Disclosure of Health Information for Research Purposes

IRB Study # 16-1305

Title of Study: Promoting Self-Care Through Exercise in Patients with Type 2 Diabetes

Principal Investigator: Rebecca Dillen
Mailing Address for UNC-Chapel Hill Department: CB: 102 Mason Farm Rd, Chapel Hill, NC 27514

This is a permission called a “HIPAA authorization.” It is required by the “Health Insurance Portability and Accountability Act of 1996” (known as “HIPAA”) in order for us to get information from your medical records or health insurance records to use in this research study.

1. If you sign this HIPAA authorization form, you are giving your permission for the following people or groups to give the researchers certain information about you (described below):

Any health care providers or health care professionals or health plans that have provided health services, treatment, or payment for you such as physicians, clinics, hospitals, home health agencies, diagnostics centers, laboratories, treatment or surgical centers, including but not limited to the UNC Health Care System and its members and affiliates (collectively, “UNCHCS”), health insurance plans, and government health agencies.

2. If you sign this form, this is the health information about you that the people or groups listed in #1 may give to the researchers to use in this research study:

Any information in your medical records that relates to your participation in this research. These records might include information about mental health, drug or alcohol use, HIV/AIDS or other communicable diseases, or genetic testing. Other information includes: lab results, weight, contact information.

3. The HIPAA protections that apply to your medical records will not apply to your information when it is in the research study records. Your information in the research study records may also be shared with, used by or seen by collaborating researchers, the sponsor of the research study, the sponsor’s representatives, and certain employees of the University of North Carolina at Chapel Hill or other affiliated entities conducting the research, or government agencies (like the FDA) if needed to oversee the research study. HIPAA rules do not usually apply to those people or groups. If any of these people or groups reviews your research record, they may also need to review portions of your original medical record relevant to the situation. The informed consent document describes the procedures in this research study that will be used to protect your personal information. You can also ask the researchers any questions about what they will do with your personal information and how they will protect your personal information in this research study.

4. If this research study creates medical information about you that will go into your medical record, you may not be able to see the research study information in your medical record until the entire research study is over.
5. If you want to participate in this research study, you must sign this HIPAA authorization form to allow the people or groups listed in #1 on this form to give access to the information about you that is listed in #2. If you do not want to sign this HIPAA authorization form, you cannot participate in this research study. However, not signing the authorization form will not change your right to treatment, payment, enrollment or eligibility for medical services outside of this research study.

6. This HIPAA authorization will stop at the completion of the study.

7. You have the right to stop this HIPAA authorization at any time. You must do that in writing. You may give your written stop of this HIPAA authorization directly to Principal Investigator or researcher or you may mail it to the department mailing address listed at the top of this form, or you may give it to one of the researchers in this study and tell the researcher to send it to any person or group the researcher has given a copy of this HIPAA authorization. Stopping this HIPAA authorization will not stop information sharing that has already happened.

8. You will be given a copy of this signed HIPAA authorization.

______________________________________________________
Signature of Research Subject ______________________
Date

______________________________________________________
Print Name of Research Subject

For Personal Representative of the Research Participant (if applicable)

Print Name of Personal Representative: ___________________________
Please explain your authority to act on behalf of this Research Subject:
_______________________________________________________

I am giving this permission by signing this HIPAA Authorization on behalf of the Research Participant.

______________________________________________________
Signature of Personal Representative ______________________
Date
APPENDIX C: DEMOGRAPHICS CHART QUESTIONNAIRE

Demographics Questionnaire

What year were you born?

Number Response

Are you:

☐ Male
☐ Female

Are you:

☐ Married
☐ Divorced
☐ Separated
☐ Widowed
☐ Never married
☐ A member of an unmarried couple

Are you Hispanic or Latino?

☐ Yes
☐ No

Which one or more of the following would you say is your race? Choose all that apply to you.

☐ White
☐ Black or African American
☐ Asian
☐ Native Hawaiian or Pacific Islander
☐ American Indian or Alaskan Native
☐ Other
Please describe

Text Response

What is the highest grade or year of school you completed?
- Never attended school or attended kindergarten only
- Grades 1 through 8 (elementary/middle)
- Grades 9 through 11 (some high school)
- Grade 12 or GED (high school graduate)
- College 1 to 3 years (some college or technical school)
- College 4 or more years (college graduate)

Are you currently...?
- Employed for wages
- Self-employed
- Out of work for more than 1 year
- Out of work for less than 1 year
- Homemaker
- Student
- Retired
- Unable to work
- Other

Describe

Text Response

Which of the following best describes your usual work schedule? If you work at more than one job, please answer for the job you work the most or consider to be primary.
Which of the following best describes your current work situation? If you work at more than one job, please answer for the job you work the most or consider to be primary.

- Day shift
- Afternoon shift
- Night shift
- Split shift
- Irregular shift/on call
- Rotating shifts

Which of the following best describes your current work situation? If you work at more than one job, please answer for the job you work the most or consider to be primary.

- I have one or more coworkers and we generally work in the same location at the same time
- I have one or more coworkers but we are generally not in the same location at the same time
- I work alone/ I have no coworkers

Do you have any kind of health care coverage, including health insurance, prepaid plans such as HMOs, or government plans such as Medicare or Indian Health Services?

- Yes
- No
- Don't know

What kind of health insurance or health care coverage do you have? INCLUDE those that pay for only one type of service (nursing home care, accidents, or dental care). EXCLUDE private plans that only provide extra cash while hospitalized. (Check all that apply.)

- Private health insurance
- Medicare
- Medi-Gap
- Medicaid
- SCHIP (CHIP/Children's Health Insurance Program)
- Military health care (TRICARE/VA/CHAMP-VA)
- Indian Health Service
- State-sponsored health plan
☐ Other government program
☐ Single service plan (e.g., dental, vision, prescriptions)
☐ No coverage of any type
☐ Don't know

What was your annual household income last year from all sources?

☐ Less than $10,000
☐ Less than $15,000 ($10,000 to less than $15,000)
☐ Less than $20,000 ($15,000 to less than $20,000)
☐ Less than $25,000 ($20,000 to less than $25,000)
☐ Less than $35,000 ($25,000 to less than $35,000)
☐ Less than $50,000 ($35,000 to less than $50,000)
☐ Less than $75,000 ($50,000 to less than $75,000)
☐ $75,000 or more
☐ Prefer not to answer

Do you have any specific health concerns or issues that you would like more information about? (optional)

[Text Response]
APPENDIX D: YOUR PHYSICAL ACTIVITY CHART QUESTIONNAIRE

Your Physical Activity Questionnaire

Vigorous & Moderate Physical Activity

We are interested in two types of physical activity: vigorous and moderate. Vigorous physical activities cause large increases in breathing or heart rate. Moderate physical activities cause small increases in breathing or heart rate.

Thinking about the moderate activities you do when you are not working in a usual week, do you do moderate activities for at least 10 minutes at a time, such as brisk walking, bicycling, vacuuming, gardening, or anything else that causes some increase in breathing or heart rate?

☐ Yes
☐ No
☐ Don’t know / Not sure

How many days per week do you do these moderate activities for at least 10 minutes at a time?

☐ 1 day per week
☐ 2 days per week
☐ 3 days per week
☐ 4 days per week
☐ 5 days per week
☐ 6 days per week
☐ 7 days per week
☐ Do not do any moderate physical activity for at least 10 minutes at a time
☐ Don’t know/Not sure

On days when you do moderate activities for at least 10 minutes at a time, how much total time per day do you spend doing these activities? ______ minutes per day

Number Response

Thinking about the vigorous activities you do when you are not working in a usual week, do you do vigorous activities for at least 10 minutes at a time, such as running, aerobics, heavy yard work, or anything else that causes large increases in breathing or heart rate?
How many days per week do you do these vigorous activities for at least 10 minutes at a time?

- [ ] 1 day per week
- [ ] 2 days per week
- [ ] 3 days per week
- [ ] 4 days per week
- [ ] 5 days per week
- [ ] 6 days per week
- [ ] 7 days per week
- [ ] Do not do any vigorous physical activity for at least 10 minutes at a time
- [ ] Don't know / Not sure

On days when you do vigorous activities for at least 10 minutes at a time, how much total time per day do you spend doing these activities? ______minutes per day

**Number Response**

The recommended amount of physical activity each week is at least 150 minutes of moderate physical activity or 75 minutes of vigorous physical activity each week.*

*Your total physical activity will be calculated as a combination of moderate and vigorous activity: total physical activity minutes = moderate minutes + 2x vigorous minutes.

- **Vigorous physical activities** include things like running, aerobics, heavy yard work, or anything else that causes large increases in breathing or heart rate.
- **Moderate physical activities** include things like brisk walking, bicycling, vacuuming, gardening, or anything else that causes small increases in breathing or heart rate.
Which of the following best describes your plans related to getting the recommended amount of physical activity each week?

- I plan to start in the next 30 days
- I plan to start in the next 6 months
- I do not plan to start

How long have you been getting the recommended amount of physical activity each week?

- I have been getting that much physical activity each week for 6 months or less
- I have been getting that much physical activity each week for more than 6 months

Here are some common reasons people give to explain why they do NOT get the recommended amount of physical activity each week. Please check "yes" or "no" as to whether each reason applies to you.

I do not know what kind of physical activity to do.

- Yes, this reason applies to me
- No, this reason does NOT apply to me

I do not have time to be physically active.

- Yes, this reason applies to me
- No, this reason does NOT apply to me

I do not have any friends/coworkers/family members who will be physically active with me.

- Yes, this reason applies to me
- No, this reason does NOT apply to me

I am not interested in being physically active.
Yes, this reason applies to me
No, this reason does NOT apply to me

Getting regular physical activity costs too much.

Yes, this reason applies to me
No, this reason does NOT apply to me

I do not have access to a fitness center or exercise equipment at work or near my home.

Yes, this reason applies to me
No, this reason does NOT apply to me

An injury or some type of physical limitation prevents me from being physically active.

Yes, this reason applies to me
No, this reason does NOT apply to me

Some other reason keeps me from being physically active.

Yes, this reason applies to me
No, this reason does NOT apply to me

Please describe what other reason keeps you from being physically active.

How confident are you that you can get the recommended amount of physical activity each week?

Not at all confident
How confident are you that you can exercise under the following circumstances:

When you are tired

☐ Not at all confident
☐ Slightly confident
☐ Moderately confident
☐ Very confident
☐ Extremely confident

When you are in a bad mood

☐ Not at all confident
☐ Slightly confident
☐ Moderately confident
☐ Very confident
☐ Extremely confident

When you don't have time

☐ Not at all confident
☐ Slightly confident
☐ Moderately confident
☐ Very confident
☐ Extremely confident
When you are on vacation

- Not at all confident
- Slightly confident
- Moderately confident
- Very confident
- Extremely confident

When it is too hot or too cold outside

- Not at all confident
- Slightly confident
- Moderately confident
- Very confident
- Extremely confident

When it is raining or snowing

- Not at all confident
- Slightly confident
- Moderately confident
- Very confident
- Extremely confident

To what extent do the following people support you in being physically active?

Family / friends

- Not at all
Of the total number of hours you spend sitting on a **weekday**, how much time do you spend in each "type" of sitting? Please mark one answer for each type.

---

**Sitting at work**

**Sitting watching TV or a movie**

**Sitting in a car or bus**

**Sitting playing video games**
Of the total number of hours you spend sitting on a **weekend day**, how much time do you spend in each "type" of sitting. Please mark one answer for each type.

**Sitting at work**

**Sitting in a car or bus**

**Sitting watching TV or a movie**

**Sitting playing video games**

**Sitting at the computer (not work)**
Muscle-strengthening activities require pushing or pulling against some form of resistance. Examples include pushups, heavy gardening, lifting weights, sit-ups, yoga, or other core strengthening exercises.

During the past month, how many times per week or per month did you do physical activities or exercises to STRENGTHEN your muscles? Do NOT count aerobic activities like walking, running, or bicycling. Count activities using your own body weight like yoga, sit-ups or push-ups and those using weight machines, free weights, or elastic bands.

- 1 time/month or less
- 2-3 times/month
- 1 time/week
- 2 times/week
- 3 or more times/week
- Don't know / Not sure

Which of the following best describes your plans related to doing muscle-strengthening activities at least twice each week? Do not include work-related muscle-strengthening activities.

- I plan to start in the next 30 days
- I plan to start in the next 6 months
- I do not plan to start

How long have you been doing muscle-strengthening activities at least twice each week?

- I have been doing muscle-strengthening activities at least twice each week for 6 months or less
- I have been doing muscle-strengthening activities at least twice each week for more than 6 months

Here are some common reasons people give to explain why they do NOT do muscle-strengthening activities twice each week. Please check "yes" or "no" as to whether each reason applies to you.
I do not know what types of muscle-strengthening activities to do.

- Yes, this reason applies to me
- No, this reason does NOT apply to me

I do not have time to do muscle-strengthening activities.

- Yes, this reason applies to me
- No, this reason does NOT apply to me

I do not have any friends/coworkers/family members to do muscle-strengthening activities with me.

- Yes, this reason applies to me
- No, this reason does NOT apply to me

I am not interested in doing muscle-strengthening activities.

- Yes, this reason applies to me
- No, this reason does NOT apply to me

Doing muscle-strengthening activities costs too much.

- Yes, this reason applies to me
- No, this reason does NOT apply to me

I do not have access to strength-training equipment at my work or near my home.

- Yes, this reason applies to me
- No, this reason does NOT apply to me

An injury or some type of physical limitation prevents me from doing muscle-strengthening activities.
Some other reason keeps me from doing muscle-strengthening activities twice per week.

Yes, this reason applies to me
No, this reason does NOT apply to me

Please describe what other reason keeps you from doing muscle-strengthening activities.

How confident are you that you can do muscle-strengthening activities twice each week?

Not at all confident
Slightly confident
Moderately confident
Very confident
Extremely confident

To what extent do the following people support you doing muscle-strengthening activities?

Family / friends

Not at all
Little extent
Some extent
Great extent
Significant extent
Coworkers

- Not at all
- Little extent
- Some extent
- Great extent
- Significant extent
APPENDIX E: TELEPHONE SCRIPT

Walking Goals

Patient's Current Goal: ***

Are you currently meeting the walking goals that you set for yourself at your last clinic appointment? YES/NO

Current Walking: ***

Encouragement provided based on patient response.

Barriers? ***

If meeting patient goal, but less than standards of 30 minutes per day, 5 days per week:
Would you be interested in increasing your walking goal? YES/NO

Patient's New Goal: ***

How likely are you to start meeting your goals? Likely/Not Likely

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REFERENCES


