Text Messaging to Motivate Individuals with Intermittent Claudication to Ambulate

By

Fify F. Thomas

A Directed Scholarly Project Submitted to the Department of Nursing
in the Graduate School of
Bradley University in
partial fulfillment of
the requirements for the
Degree of Doctor of Nursing Practice.

Peoria, Illinois

2020

Bradley University
Department of Nursing

Insert Text Messaging to Motivate Individuals with Intermittent Claudication to Ambulate

By
Fify Thomas

has been approved

11/20/2020

Approved: *Judy Walloch, Ed.D. RN*
(DNP Project Faculty Mentor name, credentials & date)

Approved: *Elista Mathew, MSN, FNP-C*
(DNP Project Practice Mentor name, credentials & date)

Acknowledgments

The completion of this doctoral project marks the accomplishment of a life-long dream of obtaining a higher level degree but this achievement would in no way be possible without the support of so many individuals. I would like to express my sincere gratitude to Dr. Judith Walloch, my mentor, professor, and project leader throughout this whole process. Dr. Walloch's patience and guidance throughout every step of this project allowed for the successful implementation of my intervention. Dr. Walloch went above and beyond her role as a professor to always make herself available and led me advise and for this I am very grateful.

I am appreciative of Elsita Mathew, MSN, FNP-C, who has been my mentor for this project. Elsita was always supportive, encouraging and had an abundance of knowledge that she was willing to happily share with me. She made me feel welcome at the clinic where she worked and ensured that I had all of the resources I needed to complete my project. Of course, I am also extremely grateful to Dr. Vinod Kumar and all of the staff at Heart Vascular and Leg Center of Bakersfield, CA for opening their doors to me, especially during a global pandemic, in order to complete this project.

Last but not least, I would like to thank my family without whom none of this would be possible. My parents, for pushing me to pursue my higher education. My husband, Akhil, whose unwavering support and encouragement allowed me to complete this program. Finally, my son, for being my motivation to complete a doctoral degree and for making me want to be the best version of myself.

Abstract

This doctorate of nursing practice (DNP) project evaluates the effectiveness of text messaging as a means of motivation for patients diagnosed with peripheral vascular disease to walk. Walking is a known first line intervention for patients with peripheral artery disease as it can prolong claudication onset time. Text messaging has been shown to be a useful motivational tool in other areas of healthcare such as weight loss and smoking cessation. These two known facts were combined to create a project that sent two to three text messages per week over 8 weeks to patients enrolled in this project at a central California cardiovascular health clinic. Survey results at the end of the study showed that 84.62% of participants felt that the messages motivated them to go on walks, 92.31% of the patients felt the text messages were beneficial to them and 76.92% of participants reported that they increased their walking time since receiving the text messages. This project was initially implemented as a pilot intervention at this particular clinic with a small group of participants, the data collected was then used to determine if the project would be continued for all applicable patients at the clinic.

Keywords: peripheral artery disease, intermittent claudication, cardiovascular, peripheral vascular disease, lower extremity pain, walking, exercise

Table of contents

Text Messaging to Motivate Individuals with Intermittent Claudication to Ambulate

Chapter I

Peripheral artery disease (PAD) is a very prevalent and costly condition that is associated with significant cardiovascular disease mortality. The annual cost paid by Medicare for PAD related care is approximately $3.9 billion in the US alone and this cost is only expected to increase. One of the biggest problems associated with PAD is pain in the lower extremities associated with ambulation, also known as intermittent claudication (IC). This pain prevents individuals from continuing their daily activities by decreasing their functional abilities. Intermittent claudication is a disease process that needs intervention in order to prevent sedentary lifestyles and worsening claudication related pain (Gardner et al., 2014).

Intermittent claudication (IC) is the most common symptomatic manifestation of PAD (Bäck et al., 2015; Wullink et al., 2001). IC associated with PAD was chosen for this project due to the high volume of patients diagnosed with PAD at this cardiovascular clinic, as well as the need for continued reinforcement of the interventions for this condition once the patient leaves the clinic. Multiple studies have shown that although walking is prescribed to patients when they are in the clinic, the majority of patients struggle with walking at home due to a variety of reasons including lack of motivation, support and knowledge about the disease process (Barbosa et al., 2014; Bentley & Kelechi, 2018; Galea-Holmes et al., 2017). The benefit of this project for patients is that it can motivate them to do necessary exercises to alleviate their IC associated pain. Furthermore, success would mean that they would need less invasive procedures in the future or that they would be able to wait longer before such an intervention happens for them.

A project, such as the one that was implemented, means that the clinic has a means of encouraging and supporting their patients once the patient with IC leaves the clinic. Motivating patients on a regular basis will mean better health outcomes which is cost effective for the patient. The intervention is also sustainable and can be continued if it is deemed valuable by the clinic.

Background and Significance

The motivation for this project stems from the fact that PAD is a very debilitating disease process if not addressed early with interventions that can even be done at home. The medical significance of PAD is rapidly growing. The global prevalence of PAD has grown by 23.5% between 2000 to 2010 and is associated with a high risk of cardiovascular activity (Gardner et al., 2014). In the United States, 8.5 million people are affected by PAD (McDermott, 2017). Intermittent claudication is described as cramping and pain in the lower legs when walking; this is caused by insufficient blood flow to the lower leg muscles. Claudication is the most common presentation of symptomatic PAD and is experienced by an estimated two million Americans (Murphy et al., 2012). The long term risks of cardiovascular mortality is very well known in patients with intermittent claudication/symptomatic PAD; some research suggests that 20% of individuals with PAD will have a cardiovascular event in a 10-year time frame. Additionally, even though early stages of intermittent claudication are not seen as dangerous, the overall risk of amputation is 1% per patient; thus, one of the main goals of management of IC and PAD is prevention of worsening condition (Popplewell et al., 2020). Development of worsening leg claudication can lead to ambulatory dysfunction; thus, it is essential that patients with IC are encouraged to ambulate (Gardner et al., 2014). Most people with PAD will not develop critical limb ischemia; however, people with PAD do develop more rapid functional decline, faster

mobility loss and have overall greater functional impairment compared to people without PAD which is why interventions to prevent these complications from happening need to be implemented. Home based walking programs can be more accessible to patients and three studies since 2011 have demonstrated its benefits in improving walking performance in individuals with peripheral artery disease (McDermott, 2017).

Intermittent claudication is caused by limb ischemia due to a decrease in blood flow with activity most often due to arterial atherosclerotic stenosis. When the patient is at rest, the oxygen circulation versus the need for oxygen are at an equilibrium whereas with activity there is not enough oxygen circulation which causes the pain of intermittent claudication (Meru et al., 2006). When there is poor oxygen circulation, there will be ischemic reperfusion of the calf muscle, decreased myofibers in the calf muscle, impaired mitochondrial function, muscle damage, impaired peripheral nerve function and decreased functional ability (McDermott, 2015). Walking is essential to the treatment of IC because it causes endothelial and skeletal muscle adaptations that fight the stenosis of the peripheral arteries which leads to decreased blood flow to the muscles of the lower extremities (Davies, 2019; Galea Holmes et al., 2017; Mays & Regensteiner, 2013).

Even though walking can cause claudication, both the American College of Cardiology (ACC) and the American Heart Association (AHA) guidelines recommend that patients with IC continue to walk in order to build up their walking endurance. The ACC and the AHA guidelines both recommend a supervised walking program that increases in speed and distance over time; unfortunately, many patients with PAD do not have access to supervised exercise (SE) programs due to financial constraints. Supervised treadmill exercise significantly improves walking performance in people with lower extremity PAD with IC (Bäck et al., 2015; Mays &

Regensteiner, 2013). The problem with SE is that patients are required to commute to the clinic three times per week. They must also cover the costs of the service, which frequently is not covered by insurance. Thus, although SE has been shown to be effective, it is not practical; especially with a global pandemic of COVID 19 and the related restrictions. This situation is why many providers encourage patients to do their own walking routine at home (McDermott et al., 2014). When supervised exercise is not a plausible option, as is the case for most patients, home-based walking programs are encouraged by the ACC and the AHA (Bentley & Kelechi, 2018).

While SE is the gold standard, there are many barriers to implementing SE. SE programs are underutilized due to trouble with insurance reimbursement, difficulty for patients to travel to and from appointments (Fakhry et al., 2011; Mays & Regensteiner, 2013), and lack of adequate training centers (Galea-Holmes et al., 2017; Mays & Regensteiner, 2013). Additionally, a systematic review of the literature showed that there is poor adherence to walking regimens after SE therapy programs are completed (Bäck et al., 2015). This project is important because it provides a sustainable way to motivate patients outside of the clinic setting. The ultimate goal of this project was to motivate individuals to complete more frequent walking exercises to prevent worsening IC, which can promote a sedentary lifestyle or a feeling that oneself cannot function properly as they are hindered by pain, leading to a poor health related quality of life (Murphy et al., 2012).

Walking is a first line intervention for treating stable IC. Unfortunately, many patients do not participate in their prescribed walking at home. This lack of exercise needs to be addressed to prevent further vascular damage. The project that I implemented was done with the goal of ultimately increasing patient participation in their prescribed walking regimens.

Needs Assessment

At this vascular health clinic on the west coast, approximately 30-40 patients with the diagnosis of PAD are seen daily, making it a very frequently seen condition. IC caused by PAD is associated with reduced walking, reduced quality of life, and increased cardiovascular risk (Galea-Holmes et al., 2017). Since walking exercises improve pain-free walking distances, and there is a lack of motivation to sustain walking programs once the patient leaves the clinic, the implementation of this project addressed this issue to improve claudication pain. There was no statistical data from this specific clinic validating how many or what percentage of patients do not comply with walking as they are told to do so by their providers; however, all of the providers agree that they have countless patients who are told to walk but then report they do not complete as much walking as they are told to do so at follow up appointments. The American College of Cardiology and the American Heart Association guidelines both recommend that individuals with PAD receive education on the benefits of walking and initial treatment for this disease process should include walking (Bentley & Kelechi, 2018). However, it is a known fact that many individuals with PAD do not participate in the physical activity that is asked of them. This could be for multiple reasons such as comorbid health conditions or psychosocial problems that hinder them from walking (Bentley & Kelechi, 2018; Barbosa et al., 2015). Nationally, a lack of adherence to exercise is also a problem. According to the U.S. Department of Health and Human Services (2017), less than 5% of adults actually participate in 30 minutes of physical activity each day and only one in three adults complete the recommended amount of physical activity per week.

The major strength identified in the SWOT analysis that helped with the implementation of this text messaging based intervention is the fact that the intervention aligns with the

organization's mission to create an amputation free county. The idea of this project came from the idea that text messaging individuals with IC on a regular basis and encouraging them to go on a walk will improve their functional ability and prevent worsening leg ischemia which decreases an individual's amputation risk. Additionally, part of the mission of this vascular health clinic is to educate patients about their health. A key component of this project was to educate patients about how exercise can help IC. Providing the most comprehensive care to patients is one of the mission statements of this organization and so implementation of this project helped facilitate that mission statement. Another great aspect of this clinic that helped with the implementation of this project is the fact that the clinic already used text messaging to confirm appointments with all of their patients. Patients are asked to respond to an automated text message 1-2 days prior to their scheduled appointment. Knowing this was beneficial to the implementation of a text messaging based EBP because it showed that the majority of the clinic's patients were already familiar with texting and have the capability to do so. One of the weaknesses of this project was that it was an evidenced based project and the owner/CEO of the vascular clinic was really hoping that a true research study would be implemented as opposed to an evidenced based project. However, after speaking to him more about this project and the benefits that it could have on his patients, he became accepting of the project, with a pilot study first, and was actually excited for his patients to participate. The fact that it was an evidenced based project implementation versus research project did not seem to matter anymore. Additionally, all of the employees at the clinic already had work roles that consume the majority of their work day and thus I had little assistance at the clinic from anyone other than my mentor. Furthermore, there was no money allocated for this project from the clinic even though there were no foreseeable costs for the implementation of this intervention except the cost of the

texting program online. A big threat to the success of this project was the possibility of technological glitches. I did not have technical support from the clinic or any other organization except the online texting program that I used. One of the biggest challenges that I assumed I would have would be the retention of participants. Since participants were not required to follow up in clinic again for the sake of this project, it was hard to ensure patient involvement in responses to a survey. Overall, it is difficult to change an individual's behaviors, but this project aimed to motivate individuals to change.

Problem Statement

According to the Centers for Disease Control and prevention (CDC) (2019), PAD affects 8.5 million people over the age of 40 in the United States alone. The prevalence of PAD increases with age (Shu & Santulli, 2018). Whenever a patient has PAD, it is important to preserve their functional ability as much as possible. IC is the most common symptom of PAD. IC can be debilitating if it is not addressed and prescribed walking therapies not consistently completed. A lack of motivation is one of the key reasons many patients fail to follow through with their prescribed home walking regimen. This project provides that extra push that many people need.

Project Aim or Purpose

The aim of this project is that participants feel more motivated to walk and increase his/her frequency of walks weekly.

Objectives for this project include:

- Patients will state they are motivated to walk because of the text messages they receive
- Patients will express that the text messaging program was beneficial to them

- Patients will report walking more than before the text messaging program

PICOT

The PICOT that guided the literature search was, in individuals living with intermittent claudication, will text messages multiple times throughout the week increase patient motivation to walk more frequently at home?

Congruence with Organizational Strategic Plan

The prevalence of IC has increased significantly in the last decade (Bäck et al., 2015). IC can lead to severe ambulatory dysfunction and critical limb ischemia (Bäck et al., 2015; Mays & Regensteiner, 2013). The clinic where this project was implemented has a primary mission to create an amputation free county. They "work to provide comprehensive and collaborative care to treat cardiovascular disease processes in a well-rounded manner in order to give the best quality of care to each of its patients" (Heart Vascular & Leg Center, n.d.). Interventions to provide support to patients outside of the clinic setting in order to encourage ambulation and prevent worsening claudication symptoms or amputation is directly in alignment with the organization's strategic plan as it aims to provide patients with the most comprehensive care possible.

Evidence

Search strategy

Research studies were primarily found through CINAHL (Cumulative Index to Nursing and Allied Health) Plus and PubMed @ Bradley. Additionally, studies and practice guidelines were found through Google Scholar and UpToDate. Initially, research was conducted using very broad search phrases such as "intermittent claudication," "peripheral artery disease," "peripheral vascular disease," "peripheral vascular disease treatment," "intermittent claudication" and

"treatment for intermittent claudication." Progressively, search terms used became more specific such as "supervised exercise for intermittent claudication," "home-based exercise for intermittent claudication," and "revascularization procedures for intermittent claudication." Studies using text messaging as a form of motivation were found using the keywords "text messaging for exercise motivation," "text messaging for weight loss," "text messaging for smoking cessation," "text message and motivational theories" and "text messaging in healthcare." Studies were restricted to those written in the English language. Research documentation published before the year 2000 was not included. Only research in which full text articles were attainable were included.

Appraisal of the evidence. Evidence that was gathered supported the validity of the various aspects of the evidenced based project that aimed to motivate an individual with intermittent claudication to walk using a text message-based intervention. Twenty-four articles were found in total and of these, fifteen of the articles were level 1, three were level 2, two were level 3 and four were level 5. Multiple studies consistently supported walking-based programs as a primary intervention for intermittent claudication. Walking was shown to be a reliable intervention based on randomized controlled trials as well as literature reviews and expert opinions. Text messaging as a motivational tool was used repeatedly for other medical programs such as weight loss or smoking cessation and so it will now be applied to encouraging program participants to walk in order to ease their intermittent claudication pain. The evidence that was found was shown to be of high quality as it is consistent and based on scientific evidence; this evidence was used to implement my evidenced based project at a cardiovascular health clinic.

Synthesis of Evidence

There was a considerable amount of research that validated the importance of walking for IC. International and national guidelines state that the primary intervention for IC is walking.

Most guidelines recommended supervised-walking programs but this is usually not a feasible option for patients and thus home-based walking programs are advised (Bäck et al., 2015; Fakhry et al., 2011; Galea Holmes et al., 2017; Gardner et al., 2014). The goal of exercise therapy for patients with PAD/IC is to improve walking ability, delay the claudication onset time (Mays & Regensteiner 2013), improve functional abilities and quality of life. Structured home-based exercise training is an effective means of improving both quality of life and functional ability (Fakhry et al., 2011).

Home-based walking programs. Adherence to walking regimens is essential for patients with IC in order to maintain functional capacity (Galea Holmes et al., 2015). Studies with exercise/walking based interventions show that these activities increase calf blood flow, improve mitochondrial function, decreases markers of inflammation, improves nitric oxide dependent vasodilation and causes a minimal increase in collateral blood flow (Davies, 2019; Hamburg & Balady 2011). While most providers encourage some level of unsupervised physical activity program at home, the problem is the fact that many patients are not active. In a 3-month study, only 16% of patients who were told to follow an unsupervised walking program continued walking at the 3-month mark (Müller-Bühl et al., 2012). It is important to address the fact that these patients are not following up with their prescribed regimens. There is a need for additional follow up from the part of the healthcare provider to encourage walking. In most clinics, patients are told that they need to walk, then due to personal barriers such as a lack of motivation, the prescribed walking does not happen, which is the biggest identifiable gap present with IC. Additionally, patients have identified barriers to walking on their own being that they do not feel safe outside, have comorbid health conditions such as diabetes or hypertension, and cannot handle possible inclines associated with walking in the community (Barbosa et al., 2015).

Studies have been conducted to test the effectiveness of home-based walking programs. Structured-walking programs have proven to be effective in patients when available and offered (Mays & Regensteiner, 2013). In two different studies that evaluated the effectiveness of home-based walking programs, patients were encouraged to walk anywhere from three days per week to everyday until they started to experience moderate to maximal levels of claudication. Each time the patient walked; they were directed to build up their walking length from 15 minutes to 60 minutes. When the claudication becomes moderate/maximal, they were told to rest until the pain subsides and then attempt to walk again. Results of both studies showed significant benefits to the patient (Fakhry et al., 2011; Gardner et al., 2014). The 6-minute walk time had increased significantly for patients who were in the home walking group (Gardner et al, 2014). The adjusted mean relative improvement in mean walking distance compared with the baseline distance had increased by 364% which is a statistically significant increase in functional capacity after 6 months of home-based exercise. Additionally, the adjusted mean change in quality of life after 6 months was also statistically significant (Fakhry et al., 2011).

External motivation. Even though patients are told to do home exercises, most patients do not complete the recommended amount of walking due to the pain that it causes, lack of walkable areas near where they live (Barbosa et al., 2015; Bentley & Kelechi, 2018), medical comorbidities, or because the benefits of walking are overlooked by patients and not thoroughly explained by providers (Galea Holmes et al., 2017). Many patients state that they are unaware of the importance of walking and do not consider it a first-line intervention, others say they forgot, and other say they lack the motivation needed to walk (Bentley & Kelechi, 2018). Only about half of the patients who are told to walk at home actually do it (Galea Holmes et al., 2017). Bentley & Kelechi (2018) points out that with increased social support, motivation, commitment,

and support from health care providers, pain is not a barrier and patients want to participate in their walking exercises. This project was created to help patients with the lack of motivation they face once they leave the clinic setting to walk as they are told to do so. This project aimed to tackle the lack of motivation patient feels towards walking by using self-determination theory to promote walking.

Walking exercises in the home setting has many benefits to the patient but changing behavior patterns of patients to encourage them to walk without additional external motivation is very challenging (Wullink et al., 2001). Two research studies were found in which an external motivation theory was incorporated into the home-walking program to help patients adhere to their walking regimen. In both studies, the patients were encouraged to walk multiple times per week, even multiple times per day. Wullink et al., (2001) used the Health Counseling Model (HCM) in meetings with the participant every 3rd week for 24 weeks to encourage walking and ensure adherence. Participants in this study felt that the constant contact with someone made them feel support and helped them integrate walking into their daily routine. McDermott et al., (2013) conducted a similar walking study but used social cognitive theory and weekly meetings to motivate participants to walk. Regardless of the motivational theory that was used, both intervention groups that were started on a home-based walking program had improvements in treadmill walking distance or corridor walking distance (Wullink et al., 2001) and 6-minute walking distance as well as pain free walking time (McDermott et al., 2013). Pain-free walking time increased from 2.72 minutes in the start of the study to 4.15 minutes at the end within the intervention group whereas the control groups average change was only from 3.12 minutes to 3.54 minutes (McDermott et al., 2013). In addition to these studies Lamberti et al. (2016) and Gardner et al., (2011), demonstrated how home walking produced statistically significant

improvements in claudication onset time, absolute claudication time and peak walking times. Conclusions of all four studies showed that home-based exercise/walking programs can provide a feasible and logical means to treating IC (Gardner et al, 2011; Lamberti et al., 2016; McDermott et al., 2013; Wullink et al., 2001).

Supervised exercise programs. Supervised exercise programs are walking based interventions for patients with IC completed in a hospital or clinic setting; however, due to the fact that SE requires strict one to one supervision and is done in a hospital setting, it is costly and often not covered by insurance even though SE is the recommended initial intervention for IC (Bäck et al., 2015). The fact that insurance does not cover supervised exercise programs is the primary reason home-based walking programs are essential. Finding ways to help patients adhere to home-based programs is important to manage IC. In studies that compared supervised exercise programs with home-based exercise programs, the home walking programs did have inferior results, although still positive (Bäck et al., 2015; Fakhry et al., 2011). Even though supervised exercise creates positive changes in regards to patients' functional capacity during the time of the intervention, adherence to walking regimens once the supervised exercise is done is low (Back et al., 2015; Davies, 2019; McDermott et al., 2014).

Text messages. Text messaging is becoming a common and acceptable means for accomplishing motivation to perform and sustain a task (Kern, 2017; Muench & Baumel, 2017; Shapiro et al., 2012). Text messaging prevalence has increased significantly with approximately 87% of the global population now owning a cell phone making texting a powerful health promotion tool that can reach multiple people at the same time (Kinnaflick et al., 2016; Shapiro et al., 2012). Research has shown that digital triggers such as texting improve individual's

engagement in the intervention that the text message is specifying. Individuals increase their physical activity immediately after receiving a message (Muench & Baumel, 2017).

Studies presented by Kinnaflick et al., (2015) and Muench & Baumell (2017) showed that individuals tend to do the activity that is being encouraged of them on the same day they receive the text message so by sending the message on certain days, the hope was that the patient would complete the requested activity on that specific day. Tailoring the message to the specific needs of the patient can yield better responses as this method motivates individuals to complete the task that is being promoted (Kinnaflick et al., 2016; Muench & Baumel, 2017).

Texting has been used effectively multiple times in weight loss and smoking cessation programs to motivate individuals to work out or avoid smoking respectively. Three different studies all demonstrated that text messages encouraged individuals to work out and boosted their self-confidence so much so that they were successful in their weight loss journey and attributed this to the text messages that they received throughout the week. Additionally, the benefits of text messaging can be achieved at such a low cost and can be done very quickly making it an easy tool to communicate with individuals to provide support and motivation. Both motivational messages and educational messages about the intervention are seen to be effective (Fischer et al., 2016; Kinnaflick et al., 2016; Silina et al., 2017). There are also multiple studies that demonstrate that text messaging aids in smoking cessation. Messages helped patients persevere with their quitting attempt (Liao et al., 2018), the positive support that these messages provided was appreciated by the majority of study participants (Liao et al., 2018; Müssener et al.,, 2016). Participants emphasized that the messages increased their motivation and helped them make a decision to stay away from cigarettes, especially in the beginning when the temptation was the strongest (Müssener et al., 2016). One of the difficulties associated with text messaging-based

interventions is with texting program malfunctions leading to messages not getting delivered or being delayed in going out. These technical errors were seen in most studies but there were still positive outcomes (Ybarra et al., 2012).

Text messaging has been seen to play a critical role in keeping patients "motivated and engaged with their providers" outside of the clinical setting (Kern, 2017). Text messaging has seen to be help with behavior change and motivation in multiple studies where text messaging was the motivating intervention (Fischer et al., 2016; Liao et al., 2018; Muench & Baumel, 2017; Mussener et al., 2016; Silina et al., 2017; Ybarra et al., 2012). Seeing that text messaging has had such strong positive effect in regards to motivating and educating individuals in achieving their goals, it was determined that implementing this same intervention in other areas, such as to encourage walking in patients with intermittent claudication, would also be beneficial.

Theoretical Framework

Self-determination theory is a macro-motivational theory that can be used to encourage change to health and physical activity (Kinnaflick et al., 2016). This theory states that people are willing to participate in change if the change that is requested of them meets their own needs for autonomy, competence and relatedness. The motivational tool must point out to the individual the benefit and value of behavior change that is requested of them (Mears & Kilpatric, 2008). When the individual is able to recognize the benefit of the intervention for them and then makes an autonomous decision to participate in the mentioned activity, they are more likely to adhere to it (Edmunds et al., 2006; Kinnaflick et al., 2016). The hope with text messages was that it would provide a sense of needed support to the patient which will then encourage him/her to go on their needed walks. The text messages that were sent to patients were based on different aspects of self-determination theory.

EBP implementation model. In addition to this theoretical model, the evidenced based project implementation model that was used is the ACE Star Model of Knowledge Transformation. This model was used because it allows a simple adaptation of nursing research to be implemented as an evidenced based project where there is a need. The five steps of the ACE Star Model include discovery which is the primary research phase, evidence summary which is the systematic review of the research obtained, translating research into action through the evidenced based project, integration of the project into practice and evaluating the impact of the intervention in regards to health outcomes (Correa de Araujo, 2016). The hope of this project was to create an effective change project using the combination of the social determination theory along with the guidance of the ACE Star Model of Knowledge Transformation.

Chapter II: Methodology

Project Design

This pilot project focused on the use of modern technology to motivate patients to complete their prescribed walking exercise once the patient leaves their clinic appointment. Text messaging has been used in other arenas of healthcare such as smoking cessation and weight loss to successfully motivate individuals and it has now been implemented in vascular health maintenance. This project adapted previously used text messaging-based interventions to align with the functionality of this project's vascular health clinic. This intervention supported the known problem that patients are not completing their prescribed walking regimens due to a lack of motivation or support and knowledge about the disease process (Barbosa et al., 2014; Bentley &Kelechi, 2018; Galea-Holmes, Weinman, & Bearne, 2017).

Project setting

The intervention was implemented at a busy cardiovascular health clinic in California. The patients chosen for the intervention all had some level of intermittent claudication or peripheral vascular disease that benefits from walking exercises. Prior to COVID-19, this particular clinic saw about 30 patients per day with intermittent claudication as one of their symptoms between the four providers who work there; so, the hope was that obtaining an adequate number of participants would not be too difficult. Unfortunately, COVID-19 did decrease the number of patients with peripheral vascular disease that were seen in clinic but all four providers at the clinic continued to be supportive of the implementation of the proposed project.

Initially, this project was only going to be implemented in patients with a diagnosis of peripheral artery disease (PAD) and intermittent claudication but as the project was further developed, a decision was made to extend the inclusion criteria of the project to all patients with a diagnosis of some form of peripheral vascular disease. The reason why this was done was to allow more patients to be included in this program and receive the benefits of this intervention. The providers asked for this broadening of the population for this project because of the benefit it could have to more patients. The reasoning for this is because walking is an intervention that the providers at this clinic encourage most of their patients to participate in, and the goal of this EBP project is to simply motivate patients to walk, which will ultimately benefit their overall health. Text messaging has shown to have positive motivational effects and so by restricting this intervention to only one group of people, we would have denied other patients access to a program that could improve their health which would have been unfair.

Project Participants

The major participants were the four main providers at this clinic. There were two physicians, one nurse practitioner and one physician assistant. The providers were responsible for determining if a patient was eligible for this text messaging-based intervention that was offered for patients who were interested. The patients who opted in to receive text messages were considered participants in this pilot project because these were the individuals who benefited from the text messages and who were hopefully encouraged to go on a walk because of the messages that they received. Inclusion criteria to participate in this pilot project was: age greater than 18 years old, provider feeling that it is safe for this patient to do a home walking program both physically and mentally, referral from their provider to participate in this project, access to a cell phone, and the ability to read and understand English. Only persons who were referred by their provider were included in the sample. Additionally, I, the DNP student, was involved in the pilot project to consent the patient to receive text messages and to explain why the text messaging intervention is being implemented. To ensure the sustainability of this program, the plan was to train the medical assistants (MA) assigned to each provider would be trained on how to do my task as the pilot intervention is carried out.

Of course, the most important participants of this intervention were the patients who were a part of the pilot project. Prior to COVID-19, about 30 patients with intermittent claudication were seen daily at the clinic which was a high volume of patients; thus, even despite knowing that some these patients were not able to walk or that some would not want to receive additional text messages, not have access to a cell phone or have a language barrier, we assumed that over two weeks, it would be easy to recruit 50 patients. Unfortunately, when COVID-19 cases surged and California implemented stringent shut down rules, the volume of patients with intermittent claudication that were seen in clinic dwindled. Most days, there were about 5 patients with

intermittent claudication or peripheral vascular disease that were appropriate for the intervention but of these 5, not everyone wanted to participate. The initial goal of obtaining 50 patients seemed unlikely at that point. I went to clinic 3 more days during those two weeks allocated to patient recruitment than I had originally planned on being at clinic in hopes of registering more patients for the intervention. By the end of the registration period, I had consented and registered 32 participants in the pilot project.

Data Collection

The goal of implementing a text messaging based motivational project was to encourage patients to walk as they are prescribed to do so throughout the week. As previously mentioned, patients are not walking as much as they should. An initial pilot of the intervention was requested by the facility prior to being fully implemented for all patients in order to ensure that the intervention will fully align with the clinic's current practice without disruption of flow. A small three question yes or no survey, created by my project mentor and myself, was sent to each of the patients receiving text messages to see whether or not the patient felt the messages were motivational and/or beneficial at the very end of the project. Two separate text messages on two separate days were sent to patients asking them to complete this survey that was sent to the patient as a link in the two final text messages that the patient received. The choice to respond to the survey was the patient's but I did let all patients know that there would be a survey in the end when I was registering them for the project. The survey was completely anonymous. The survey had the three following questions:

1. Did you feel that the text messages you received motivated you to go on walks?
2. Did you feel that the text messages you received were beneficial to you?
3. Have you increased your amount of walking since starting to receive these messages?

This evaluation was done in hopes that it would provide the clinic administrator with enough verification of the effectiveness of this intervention.

Consideration was given to use to the International Physical Activity Questionnaire – Short Form (IPAQ-SF) to determine whether there was an increase in physical activity performed by each participant of the project from start to end of text messaging intervention; however, a final decision to not use the IPAQ-SF was made. It was decided to not use the IPAQ-SF because of the fact that data suggests there is considerable inconsistencies with the reliability of the data that is obtained using this questionnaire as it is dependent on patient memory and honesty (Sylvia et al., 2013). Although the goal of this intervention was not to see if there was an increase in walking, but rather, to see if the text messages were motivational to patients to encourage them to walk, it would have been a bonus piece of information for clinic administrators to know when deciding if they would keep this intervention running once I finished my project's implementation. Using question number three in the final patient questionnaire was a simple and efficient way to gauge if patient's felt they walked more because of the text messages. Even if patient self-reporting is not the most reliable data, using only question number three to determine if an individual was walking more or not was simpler than having patients complete a questionnaire such as the IPAQ-SF.

Project Plan

Since an initial pilot was implemented prior to implementation of the intervention system wide, the intervention was phased into three parts. Part one was identifying the patients who were appropriate to receive the text messages. Part two was the time period in which patients received text messages. Part three was the evaluation of the effectiveness of the project based on

the questionnaire results from the patients who were receiving the text messages. A graphical representation of the timeline can be seen in Appendix A.

Prior to this project being implemented, I sought approval from Bradley University's CUHSR as the clinic in which this project was implemented did not have its own Institutional Review Board (IRB). I received approval from the clinic administrator to get approval from Bradley University's IRB as the clinic does not have their own (see Appendix B).

Part One. Part one required the participation of all the providers at this clinic. Spread out over 8 days over two weeks, providers were asked to identify patients with intermittent claudication or peripheral vascular disease, who were able to walk, speak English, receive text messages, and who were to be prescribed walking plans for home. The inclusion of any patient with a diagnosis of peripheral vascular disease was done so that providers could include patients who they felt that walking at home was an appropriate therapy for the patient and the patient would benefit from the text messaging intervention. Once the patient was identified as appropriate for the intervention, I went into the patient's room and explained the project to the patient and consented and registered the patient for the texting program while the patient was still at the clinic. The consent stated that although the patient will be encouraged to walk multiple times during the week, the patient must determine if it is safe for them to walk on any particular day (see Appendix C). The consent was a requirement by the clinic and necessary as I am a student and was not employed by the clinic where this project was being implemented. The patients were registered into the text messaging program right after they signed consent. Registering into the texting program involved the patient sending a text message with the word "WALK" to a specific phone number from their own cell phone. The participant then received an automated message from the texting platform that told them thank you for participating and also

the dates in which the project would run and how they can opt out of the program at any time. Participants also received an informational document about the project (see Appendix D). Part one was implemented over two weeks in order to register as many patients who were willing to participate.

To ensure sustainability of this program, the consent for participation and registering to the texting platform were to be obtained by an MA. At this clinic, normally each provider is assigned two MAs. The MAs sees the patient first and last. The MA reviews the patient's history and ensure that all of their known diagnoses are documented and thus the MA is aware of the patient's diagnosis. Once the patient is seen by the provider, the MA goes back into the patient's room and handles all of their discharge instructions and schedules their next appointment. Prior to the MA going back into the room, the provider communicates to the MA what is needed for each patient. So, during the MA and provider interaction after the provider sees the patient, the provider can inform the MA if he/she thinks any particular patient is a good candidate for participation in the text messaging based intervention and can ask the MA to set up consent for the patient if the patient had agreed. The provider would be the one who explained the intervention to the patient when in the room with the patient. This task could have been seamlessly added into the discharge tasks that the MA already handles. Since the provider would have already talked about the text messaging program to the patient while in the room with the patient, the MA only had to get consent and help the patient send a quick text message from their phone. The text messages will have already be pre-programmed into the texting platform and will send automatically to anyone registered in the program on a pre-set schedule..

Part two. Part two was the actual intervention phase. In this phase, patients received two to three text messages per week for 8-weeks total. A bank of text messages was created to be

used throughout this intervention, not all of the messages were used during this intervention but a bigger text messaging bank was created so that in the chance this project would have been kept ongoing at the clinic, the messages would have already been written out (see Appendix E). This whole bank of text messages was given to the medical director at the clinic, in the chance that it could be of use for the clinic in the future. The used frequency of text messages per week was decided because it is recommended that individuals with intermittent claudication walk at least 3 times per week for a total of 30 minutes of interval walking for at least 3 months before some relief in pain is noticed (Bearne et al., 2019; Iso & Suzuki, 2015; Rudisill et al., , 2011). Some weeks patients received only two messages per week so as not to over engage the patient and frustrate them with an inundation of messages. The studies reviewed in the synthesis of evidence used text messaging-based interventions ranging from six weeks in length to one year. This pilot intervention occurred over eight weeks due to time constraints of having a 15-week semester and having a delayed start due to COVID-19.

The text messages that were sent were written using self-determination theory (SDT). SDT has been seen to be beneficial in terms of motivating individuals to participate in exercise. SDT states that there are two different types of motives for behavior: intrinsic versus extrinsic motivation. Intrinsic motivation is doing something because of the inherent joy that it will bring such as personal accomplishment, excitement or in this case relief of pain. Extrinsic motivation is when someone participates in an activity to gain a reward that is not necessarily related to their own wants/desires; for example, when you participate in an event solely to prevent social disapproval. Intrinsic motivation is stronger and encourages more action. The hope of this project was to frame text messages in a way that motivated patients by showing them the benefit that walking could have on their life and encourage participation in the desired activity

(Edmunds et al., 2006; Teixeira et al., 2012). The text messages were related to different aspects of SDT: identified regulation themed motivation, autonomy, relatedness, and competence.

To protect patient privacy, the messages did not have any identifiable information in them. The text messages were all generic messages that were sent to individual cell phone numbers one at a time via an online message sender. The online message sender was not uploaded with any patient names. Messages were only sent to a patient once the patient agreed to receive text messages from the clinic in written communication via a consent documentation and after the patient opted into the texting program by sending an initial message from their own phone. In regards to sustainability, the text messages were pre-written by me and uploaded into the text messaging system and set up so they would send on a pre-set date and time to the people who opted into the texting program. The messages were programmed to go out on set dates two to three times per week for eight weeks.

In order to ensure that the text messages were being sent efficiently and sustainably, an online message sender subscription was purchased. Slicktext.com is an automatic text message company that allows an individual to have pre-typed up messages that are pre-programmed to go out to patients at set times. Since the messages did not have any identifiable patient information, there was no need for encryption in the messages; however, SlickText.com is HIPAA compliant and so the messages were encrypted initially when going out from SlickText.com's platform. I subscribed to a plan on SlickText.com that provided me with ample extra messages per month in order to be on the safe side and never run out of messages. This plan allowed for sending 1000 messages per month at $49 per month. Unfortunately, the cost of this plan does continue to rise on SlickText.com. If this program were to become a part of the clinic's daily functions, and is used on all patients with intermittent claudication or even all patients who are appropriate for a

walking intervention, costs would go up for the text messaging program. According to SlickText.com's pricing information, it would cost $79/month for 2,000 text messages monthly, $139/month for 3,600 text messages monthly and beyond 3,600 messages monthly, an individual would have to contact SlickText.com directly to get a quote. However, using a texting service such as this is what ensured sustainability of the program because this minimizes the work that an individual person has to do on a weekly basis. Slicktext.com makes it so that once the program is set up, an employee will only have to get consent from patients and then add cell phone numbers to SlickText.com's database by showing the patient how to opt in to the texting program by sending a message from the patient's own phone. The work of the medical assistant is one that could seamlessly fit into their normal routine and should not add more than 5 minutes to the follow up care that they already provide each patient with once the patient sees their provider. Since the consenting and obtaining cell phone number from patient becomes a part of the MA's routine follow up with the patient, it does not add to the budget and thus the only component of the budget/expense sheet for this intervention would be the cost of the SlickText.com programing which for the sake of the pilot intervention will be $49 for six months (April 2020 to September of 2020). The text messaging intervention was implemented through the Summer 2020 semester which ran from May 2020 to August 2020 (see Budget in Appendix F). After the initial pilot project implementation, the cost of this project implementation would have to be taken on by the clinic, if they decided to continue with the program.

Part three. Part three was the evaluation stage. The week after the motivational text messages stop, the patients received two text messages with links to the customized three question survey created specifically to evaluate what patients thought of the pilot project. These two messages were both the same in case the patient forgot/chose not to respond to the message

initially, they received an additional reminder to complete the survey. The hope was that at least 30 of the original participants would respond in order to meet clinical significance; the idea was that the fact that patients not needing an in-clinic follow up would make responding easier and more practical for patients. The online survey tool, Qualtrics, was used to create and send out the survey that participants of this QI project were asked to complete. Qualtrics is provided to Bradley University students free of charge. A Qualtrics survey was created so that any concern for ballot stuffing is eliminated and patient responses remain anonymous.

The synthesis of evidence showed that text messaging has been beneficial in other areas of healthcare such as smoking cessation or weight loss motivation; however, this particular clinic wanted to do a pilot intervention of using text messages to motivate walking before implementing it with all of their patients. As this is a pilot intervention, part three was done to validate the benefit of the text messages in hopes that patients would find the messages motivational, beneficial and would report that they were walking more frequently. The validation that was received from the questionnaire responses was the purpose of part three of this EBP and will hopefully mean that the clinic will continue with this intervention at some point when a more normal routine is achieved at the clinic. After the survey week was over, the data was analyzed to determine how patients felt about the text messages and the information was shared with the providers at the clinic.

Data Analysis

Data analysis was based on the percentage of individuals who answered yes or no for each question. This percentage was calculated to determine what the majority of patients thought about this intervention. The goal was that more than 50% of patients feel that yes, the text messages were motivational and beneficial and yes, more than 50% report increasing their

physical activity due to the messages. More than 50% was the set benchmark goal that we set since more than 50% means that the majority felt one way or another. Additionally, this was the number that the medical director at this clinic stated he needed to see this project as valuable and worth continuing beyond the pilot intervention.

Ethical Issues

The biggest ethical issue that comes up with a text messaging-based intervention is the concern for a privacy breech. However, this is eliminated because no personal information was sent through the text messages. All text messages were generic, informational or motivational in nature. Slicktext.com did not have any names uploaded into their system; only phone numbers. I, myself, did not have any documentation involving patient names taken with me outside of the clinic. The only document with patient identifiable information was the consent form that was signed, which has the patient's full name and cell phone number but was kept at the clinic. Within the consent form that all patients signed to be a part of this project, it is written that by signing the consent, the patient is okay with sharing their protected health information with me, a student of Bradley University who is not an employee of the clinic in which this project was implemented. Since I am not an employee of the clinic in which the project was implemented, I signed the confidentiality agreement of the clinic which allows me to see all of the clinic's confidential patient information with the understanding that I will not share any protected health information or patient identifiable information (see Appendix G).

Chapter III: Organizational Assessment & Cost Analysis

Organization Assessment

In regards to the organization that this intervention took place at, there were many positives and the most important was the fact that the providers liked the idea and were willing to

let their patients be involved. However, since a requirement was given that a smaller version of the intervention be tried with an easily controllable amount of participants to test the smoothness of the program and to see whether the patients found it valuable, a pilot study was implemented first which was this DNP scholarly project. Additionally, the anticipated high volume of patients with a diagnosis of intermittent claudication or peripheral vascular disease made this intervention beneficial as it could hopefully benefit a large number of people. Even though a smaller than desired number of patients was obtained for the pilot project, it was great to know that at least the few that were able to participate had positive outcomes. Finally, the clinic mentioned that since this intervention is solely encouraging that patients to go on walks, this could potentially be something that is implemented to all of their patients who are told to exercise and not just those with intermittent claudication as walking is an appropriate intervention for many vascular health diagnoses. The negative of this program is that there is no way to fully automate it in a cost-effective manner. The MA, or someone else, will always have to consent patients and help them register into the texting service. Additionally, someone will have to be responsible for managing the text messaging platform at least a couple of times per year. This does take time from the individual's other routine tasks and might get put on a back burner if something with a higher priority arises. However, overall, the amount of work to sustain this project would have been minimal if there was some guarantee that the clinic would be staffed as amply as it was prior to COVID-19.

Cost effectiveness

The whole cost for this program was only the use of the automated text messaging program which was needed for the smooth implementation of the intervention. This cost will continue to rise as the program becomes more imbedded into the routine of the facility as more

patients means higher quantities of messages that are being sent out weekly and this this is a determent for initiating the tool throughout the whole clinic. However, three different automatic text messaging companies were compared prior to this one being selected as it was the most cost-effective option. In addition to the cost of the program, the time that it takes the medical assistants to get consent and upload new phone numbers will also be considered an expense as it is during their paid hours that these tasks will be completed.

Chapter IV: Results

Analysis of the implementation process

Implementation of the pilot project did not go as smoothly as I would have liked for it to go due to the global COVID-19 pandemic. There were a lot of changes that occurred with the implementation timeframe due to COVID-19 changes in regulation and patient flow rates at the clinic. The initial timeline for project implementation was that it would be completed within the 15-week semester but due to the delay in starting, the project did extend two weeks beyond the end of the semester. In addition to a delay in the startup of the project, the whole project itself had to be cut short by three weeks. Participant recruitment was originally going to span over three weeks with me at the clinic two days per week; however, when the project was actually implemented, I went to the clinic eight days spread out over two weeks. Secondly, the participant would have received eight weeks of motivational/educational text messages, but this was changed to seven weeks. I had also allocated two weeks for text messages that asked for survey responses to be sent out in hopes that it would encourage more people to respond but this was decreased to one week. Since the time for the intervention phase was cut short, the number of messages sent to patients also went down.

Originally, I had a goal of recruiting at least 50 participants to be a part of the pilot intervention with the expectation that I would get more than that since the clinic saw on average about 30 patients with peripheral vascular disease per day between the four providers prior to COVID-19. However, once the clinic started taking patient's back in the clinic, a lot of the patients who would be applicable for my intervention were not seen in-clinic but rather via telehealth since all stable patients were seen via telehealth so as to reduce the risk of exposure to COVID-9. Since many of the stable patients were seen via telehealth, I was unable to ask/consent these patients to participate in this project. The patients seen in clinic were the patients with more comorbidities, more walking limitations, more elderly and not as technologically savvy and so it was harder to recruit patients to participates in the pilot. Additionally, the flow of patients at the clinic had decreased significantly because of COVID-19. At the end of my eight days at clinic, I was able to consent and register 32 patients to participate.

After patients were recruited, the intervention phase began. This intervention phase was dependent on the online text messaging platform, SlickText. Originally, I was planning on purchasing services from this company from April 2020 to September 2020 but due to the delay in the start of project implementation, a plan from SlickText was purchased for an additional month. The additional month cost another $49. The original budget for this project with this many expected participants was $249 but this did go up to $298. Messages were sent to patients two to three times per week. Patients received these messages without any known technological glitches. As far as I am told from clinic staff, no patients voiced any concerns regarding problems receiving messages, not being able to stop receiving messages, or in any relation to the implementation of this project. During the intervention phase, of the 32 original participants, one participant opted out of the texting program at week 3 and a second participant opted out of

receiving the messages at week 5. The patients can opt out for any reason; no reason as to why they opted out is asked of the patient. The patient simply texts the word “STOP” to the text messaging conversation and they stop receiving any further communication from my intervention except notification that they have been removed from the project.

After the seven weeks of motivational/educational text messages, each participant was sent two messages, two days a part, asking to participate in a survey asking for their opinions on the text messaging project. Again, no known problems with this is known. The most important lesson learned throughout the whole implementation aspect of this project is the need to be flexible when things do not go to plan. I had no control over when I could start my project and was completely dependent on the clinic allowing me to come back despite the ongoing pandemic and so the need to be flexible was very much present. The biggest change to my project was a decrease in the time I had to implement the project and although this is a big change, it did not affect my ultimate goal of motivating patients to walk as I was still able to do this, just on a smaller scale. The clinic where this project was implemented at was very willing to work with me and wanting to get this project started and so I was really appreciative of this.

I was unable to train the MAs while at the clinic implementing my project as each provider only had one MA working with them at a time and thus they were unable to spend time with me or consent patients on their own as this would slow down their patient flow. Additionally, due to COVID-19, having the MAs come in on a separate day to be educated about the project enough so that they could consent patients, was not possible due to limitation on the number of people allowed to be in the clinic at one time.

Analysis of the project outcomes

Of the 30 participants, 14 participants responded to the survey which means there was a response rate of 43%. The first question asked participants “did you feel that the text messages you received motivated you to go on walks?” and 11 out of 13 participants answered yes and two participants answered no. The second question asked participants “did you feel that the text messages you received were beneficial to you?” and 12 out of 13 participants responded yes and one person responded no. The third and final question asked patients “have you increase your amount of walking since starting to receive these messages?” and ten participants responded yes whereas three responded no (see Appendix H). The only data that can be identified as missing is the survey responses from the people who did not respond but this is not because the data is missing but rather because these participants chose not to respond to the survey.

The outcomes of this project are relatable to the SMART goals in that the goal of this project was to determine if the self-determination theory based text messages were found to be motivational and beneficial by patients and additionally, to know if patient’s walked more because of the messages. These goals were very specific and the whole project was created with these goals in mind. The goals were measured by using a survey with three questions that evaluated patient’s opinions about this intervention. A benchmark goal of greater than 50% “yes” responses to each question was determined prior to implementation. This number was measured by calculating the percentage of people who answered yes versus no for each question. This project was supposed to be completed during one school semester; however, due to the pandemic this project implementation did extend beyond this time frame but that was due to extenuating circumstances and had normal circumstances been at play, such a delay would have been unlikely and the project achieved within the originally set time frame. As far as realistic, the

successful implementation of this project shows the potential that it has to be implemented. The facility where this project was implemented was very willing to allow a student to implement such a project and the technological resources that were needed to implement this project were easy to use and understand. The objectives of this project were timely in that the hope was it would be completed by the end of the semester, the collection of the survey results and analysis of these results was the completion of this goal which all happened within a total of 15 weeks, which was close to the original plan.

Chapter V: Discussion

Findings

Because of the implementation of this project, the biggest change that needed to happen was a slight change in flow so that I could see the patient after the provider saw the patient. I had to see the patient so that I could tell him/her about the project and then consent the patient to participate, if they were interested. This delayed the patient leaving the clinic by about 5 additional minutes which is not a big deal when the clinic is not too busy. Due to COVID-19, the flow of patient's at the clinic had significantly decreased which, looking back, might have worked in my favor as no one was in big rush to clear patients out of rooms to get the next patient in right away. I think that if the clinic had its normal flow of patients, I might have felt more rushed when talking to the patients because there are only so many rooms that are available for patients and I wouldn't be able to hold up a room too long without delaying the next patient's appointment time.

The project itself ran very smoothly at the clinic. The majority of patients that I spoke to did agree to participate and when I was initially speaking to them, the patient voiced excitement about the project and thought it could be beneficial. There were no patient complaints in regards

to this project from beginning to end of project implementation. Additionally, there were no technological glitches that I am aware of. As far the text messaging program online, all of the messages sent out in their entirety at the time they were supposed to go out without any difficulty. There were no reported injuries from any patient in any relationship to the text messaging program. No patients reported being charged additional costs for the messages they received either. The biggest difficulty in implementation was the decrease in the patient count at the clinic and not having a higher participant count in the pilot project. The lower participant count does made it harder to say with definitive certainty that this intervention is something that will work and should be implemented long term, despite the results of the survey being positive. Another downfall was the lack of responses on the survey. Only 43% of the participants responded, which although is not terrible, with the already low participation rate, it makes it harder to make conclusive statements on the validity of the program. Had more participants been able to join in on the pilot program, then a lower response rate would not be a significant downfall as there would have still been a substantial number of responses.

SlickText.com sent the messages with the survey link to 30 total participants and of those 30 people, 14 responded. There could be a varied number of reasons why the participant chose not respond to the survey such as lack of internet access, not technologically savvy enough to complete the survey, or just did not want to complete the survey. However, the results that were collected demonstrate that participants did find the program to be effective for them. The strong majority of patients who responded answered in ways that promoted the benefits of this intervention as their responses were mostly affirmative of the benefits of the intervention. These results show that the majority of participants did feel that they had a positive experience from receiving the messages.

The use of self-determination theory when writing all of the text messages can be attributed to the positive responses from patients. As previously discussed, self-determination theory is a motivational theory that has been shown to effective to help motivate individuals to perform physical activity. The theory itself has many aspects of it, every part does not necessarily relate to motivation but incorporating the parts that do could have really helped facilitate motivation in participants to walk. This theory states that there are three basic psychological needs that need to be met prior to the participant being willing to change their behavior so many of the messages that were sent were aimed at achieving this goal. Using this particular aspect of self-determination theory encouraged the formulation of messages that hopefully made the patient feel empowered to make good decision for their health, competent enough to be able to perform the tasks asked of them and also feel that they had someone who acknowledged what they were going through and thus felt more connected with their provider. Additionally, by using the idea of identified regulation, another aspect of self-determination theory which states that when the benefit of a certain behavior is understood, people are more likely to perform that action. Thus, a significant amount of the messages were educational in nature which hopefully taught patients how walking could benefit their health and thus provided an increased motivation to walk.

This project was implemented since research clearly pointed to the benefits of walking for patients with peripheral artery disease and the gap in care that was identified by the providers at the clinic being that patients reported they do not walk as much as they should at home. Further research indicated that text messaging had the potential to alleviate this gap in care by being a motivational source for patients; like text messaging is in weight loss and smoking cessation programs for other patients. By giving patients this extra push, the long-term goal is

that they can create positive changes in their life that would benefit their health over time. The overall goal of the project to see if text messaging was motivational and beneficial to patients was successful because the responses were positive; however, as a pilot intervention done to prove that this would be beneficial if implemented throughout the whole clinic, it would be hard to justify the expenses and the change in overall clinical practice to implement it clinic wide with such a small number of participants. Additionally, the fact that this intervention was implemented during a time when the clinic was not functioning in its normal routine or its actual capacity makes it difficult to determine if the intervention will run as smoothly in a busier setting.

Limitations

The biggest limitation that this intervention had was the small sample size. The original goal was to have at least 50 participants, which seemed like an easy goal while planning this intervention due to the previously high volume of patients with intermittent caudation/peripheral vascular disease. However, when COVID-19 hit, there were a lot of changes in the number of patients that were seen in clinic versus being seen on telehealth. A lot of the healthier patients, who were probably more able to participate in this intervention, were seen on telehealth as they were more stable. These were the patients that were ambulatory, who were more mentally clear and tended to be more technologically savvy since they were able to figure out how telehealth worked. A lot of the patients that were seen in clinic were the more complicated patients who had more severe effects of their disease processes such as constant shortness of breath, supplemental oxygen requirements, being wheelchair bound or needing a cane to ambulate. Sometimes, when I thought a patient in clinic was a good fit for the study, after speaking to them, I would learn that they either did not have a cell phone, did have a cell phone but it was

not a smart phone so it did not have the ability to open all of the links I would send them, or they themselves said this intervention just isn't for them. A lot of patients that were seen in clinic were also the patients with a language barrier which made them not a good candidate to participate in this intervention as the intervention was completely in English.

Prior to starting the intervention, thoughts regarding an online consenting process were brought up so that patients who were seen via telehealth could also be included in the intervention. However, while brainstorming how this could be incorporated into the normal clinical flow, it was deemed that this would be too difficult. Most of the time, providers were taking telehealth calls from home or their telehealth calls were scheduled back to back and so unless they got out of one call, they couldn't get into the next. It works better in the in-person clinical setting because the provider sees the patient first, comes out of the room, says this patient is a good candidate or not and allows me to go into the patient's room and consent the patient and while I am in the patient's room, the provider can go see his/her next patient which doesn't cause a delay in the flow of patient care. This worked out especially well during COVID-19 as the overall patient counts in clinic was lower so room turnovers did not need to happen as they normally would have needed to and I did not have to rush with patients.

Another design flaw was that there were fewer medical assistants at clinic during COVID-19 than there normally were prior to COVID-19. Usually, there are two medical assistants per provider. The original goal was that I could train the medical assistants to consent patients for this intervention once I leave the clinic and the program is implemented throughout the whole clinic. The reason why this was the original plan was because each medical assistant already goes in to see every patient after the provider is done with their appointment to schedule follow up appointments/complete any needed paperwork and so it made sense to just add this

one task to the medical assistants work. However, since there was only one medical assistant available per provider, it was hard to add on an additional task to the MA's workload because this could slow them down and delay checking out this patient and getting the next patient ready for the provider. Of course, during the pilot intervention, this was not a problem because I was there to do the consenting but in regards to implementation of the project now, after the pilot, this would be a downfall as I am no longer there to consent patients and for the time being, each provider only has one MA assigned to him/her.

Implications

Practice Change

The synthesis of evidence shows the benefits of this intervention. When looking at the research, the benefits of walking are very clear for patients with peripheral arterial disease. In general, exercise at a moderate intensity, which walking at a brisk pace counts as, is great and recommended for everyone so it is clear why implementing this project would be beneficial and why changing the way a clinic works for it would be appropriate. However, the problem with implementing this long term for this particular clinic is twofold. One, the clinic already has a text messaging platform that they use which is connected to their scheduling system. This platform, TigerConnect, is integrated into the whole functionality of the clinic as it is a part of their scheduling system. The clinic use TigerConnect to send out automated text message reminders to patients about upcoming appointments. The benefit of TigerConnect for this clinic is that it is a known healthcare specific messaging, scheduling, data sharing platform that the clinic is now comfortable with. The staff all use TigerConnect to discuss daily tasks via a text messaging application that TigerConnect offers that is known to be safe in the chance that patient information is also shared and thus TigerConnect not only benefits the patients at the clinic but is

also a part of the overall workflow of the clinical staff. Unfortunately, although TigerConnect has a significant amount of functionality that is valuable to the clinic, the feature that allows the clinic to send out broadcast messages to staff is not included in the plan of TigerConnect that the clinic has purchased. Broadcast messaging is when messages are pre-programmed into the texting platform and sent out automatically to individuals on pre-set dates and times. The program that was used for the pilot intervention was called SlickText and although this platform allows messages to be set up in advance and will be automatically delivered at a pre-set date and time, it does not have the capabilities of TigerConnect in regards to patient scheduling or health information sharing. SlickText is a mass media organization not specific to healthcare. Since an additional cost per month would be incurred by the clinic, it is difficult for the clinic to move forward with this intervention at this time. After speaking to a representative at SlickText, it was estimated that the clinic would have to pay between $300 to $500 additional per month on top of their current cost in order to have the ability to send custom HIPAA compliant messages to patients. This cost is especially high due to the number of users that the clinic already has on their TigerConnect plan that cannot be reduced. Although SlickText works for the purposes of this intervention, it is not the best product for all of the other needs of this clinic and thus this would have to be an additional texting tool that the clinic would have to purchase in addition to TigerConnect which adds on an additional unnecessary cost which would be the second problem. In a time when COVID-19 brings on so much uncertainty, it does not seem appropriate to take on an additional cost for this clinic. Even if the cost is not too extreme to the clinic, there were so many unforeseen additional expenses that the clinic had to pay for in order to make the clinic comply with all of the state's COVID-19 regulations that adding on an additional cost of a secondary text messaging program at this time is just not logical. Once things are back to normal,

or a new normal, this intervention is something that this clinic would be willing to consider again and I hope that it can be implemented at that time.

I do believe that this project is sustainable long term. There is some work that is required of the staff at the clinic but this work is not too time consuming nor difficult. If this project were implemented once things go back to normal, the medical assistant could consent the patient to participate and get them connected to the text messaging program when they go back into the room with the patient after the provider sees the patient, assuming that the clinic would go back to each provider having two MAs. The paper consent can then be scanned into the patient's chart, just as all consents are scanned in and the hard copy can be shredded. The consent cannot be omitted as the consent alleviates the risk of liability that the clinic must take on. Since the text messages will be pre-programmed into the text messaging database months in advance to going out, it is unrealistic to predict what the patient's health status, the weather condition outside, or overall safety of the patient walking at any given time will be and thus it is essential that the patient sign off that they understand that although they are encouraged to walk, the patient walks at their own risk after taking into consideration their own safety at any time. In regards to upkeep, the online platform would have to maintained at least one or two times annually and someone would have to be assigned to this. The text messaging bank is created, and these messages would be uploaded into the program that they choose. The individual responsible for this would be in charge of changing the send out dates of the messages once or twice a year. Messages would repeat but ideally only once per year and so most patients would not remember seeing the same message 12 months previously, even if it did repeat. This is an intervention that can easily be implemented in any cardiovascular clinic as long as they are willing to pay for the cost of the texting platform. Once the technological aspect of it is set up once, the program

should run smoothly on its own with minimal annual upkeep.

Future Research

Future research would include doing this pilot intervention once again once a more normal routine is established at the clinic. This would allow for the inclusion of a greater volume of patient participation and would allow the clinic to see that this intervention would truly benefit their clinic and could be incorporated into their normal routine seamlessly. Future research could also be done to see what other health conditions walking could benefit and then this project could be implemented to those patients as well, this could be even beyond the scope of cardiology but into endocrine, psychology, or whatever other realm of medicine is of interest. There are many opportunities for interdisciplinary collaboration in this project as we know that activity benefits an individual's health and so this project could be expanded to simply encourage being active for able patients in any clinical setting. Interdisciplinary collaboration would happen in the form of setting up the text messaging based program so that it would be appropriate to the specific clinic. Self-determination is one that has been used successfully for the purposes of motivation but its use specifically in text messaging is one that is newer. In fact, throughout all of the research done for this project, only three different research articles were found that demonstrated the benefits of text messages based on self-determination theory in exercise and so additional research on this topic specifically good be beneficial. This project also has implications for physical therapy and occupational clinics as well and so further research would justify the use of this project in various different healthcare settings.

For dissemination within the organization, the plan was that I would train the MAs in the office register the patient to the texting programs from their phone while at the clinic. Now that each provider only has one MA assigned to them daily, increasing the work of the MA during

checkout would slow down bringing in the next patient. Hopefully, this is possible once more patients are being seen in clinic and more of the regular staff are back to their usual routines. Unfortunately, as of right now this plan is on hold but I have made it clear to the clinic that I am always available, if they wish, to implement this project in the future.

Nursing Significance

This intervention shows the potential that providers could have on their patients, even when the patient is not physically in the clinical setting. It allows us to motivate and be present with our patients outside the walls of the clinic which hopefully encourages the patient to make healthier choices in their everyday lives. Providing patients a sense of autonomy, competence, and feeling of being understood encourages the patient to be more motivated to take care of their own health. As providers, our goal is to be a support system for our patients and this project gives us the opportunity to do so while also uplifting our patients. Additionally, the use of identified regulation in this intervention allows us to educate our patients and gives them an opportunity to take control of their own health by learning more about their disease process and how it affects their bodies and what they can do to help themselves. Communicating with patients more frequently empowers them and shows them that there is someone that is really rooting for their wellbeing. Using technology to communicate with patients allows patients to have better access to their providers and feel more involved in their care. We live in a world where technology drives a lot of how we interact with people and so it is essential that providers learn to communicate with patients in ways that are more convenient to the patient. Text messaging is such a readily accessible tool for most people in our developed world and so using this tool to stay in contact with patients is a promising technology and one that providers and organizations should get comfortable doing.

Health Policy

It is obvious that text messaging is becoming more prominent today. At least 85% of physicians and nurses have smart phones and about 60%-80% of clinical staff use text messaging to communicate amongst each other; many clinical staff prefer to communicate via text messages due to its ease of use (Liu et al., 2019). As text messaging becomes more widely acceptable, users must be aware of the risks that are associated with it. There use of text messaging in clinical setting is one that comes with a lot of risk, especially if security rules associated with The Health and Insurance Portability and Accountability Act (HIPAA) are not ensured. The messages that are sent through these servers can be saved in unknown places such as the email carrier's or the cell phone carrier's data storage which can be stolen by thieves or data breeches (Liu et al., 2019). When it comes to sending mass messages for patients, the messages should in no way be able to identify an individual but should be generalized and applicable to most of the people in the group. Ensuring that the text messaging platform that is being used is HIPAA compliant is of utmost importance as a lot of texting platforms are not HIPAA compliant. HIPAA requires a certain amount of encryption from the message sender as well as a a guarantee that the information in the message that are being sent will not be disclosed for any other impermissible uses (Liu et al., 2019) Additionally, when sending a text message to a patient, providers should remember that someone else could be using the patient's phone and could accidentally see something that the patient would not want anyone else to know about thus violating the patient's privacy which is where obtaining a consent to communicate through text message prior to doing so with the patient is essential. Using text messaging in healthcare can have so many benefits for patients but it is important that extreme caution be used when texting is in use in order to always maintain privacy of patients.

The Healthcare Information and Management and Systems Society (HIMSS)set up specifications about texting patients but there is room for policy improvement. Further clarification is needed regarding the provider's responsibilities when communicating with patients; such as how often do the messages need to be deleted from the provider's texting program, how often do consents need to be renewed, and how quickly are providers expected to respond to patients if providers choose to communicate in a two-way fashion via text messaging with patients (Liu et al., 2019; Storck, 2017).

Chapter VI: Conclusion

Value of the Project

Implementing this project throughout the whole clinic can have a positive impact on hundreds of patients; it already has for the majority of participants who responded to the survey in the pilot study. Having the ability to motivate patients once they leave the clinic can really leave a lasting impact on patient health which is what this project aims to do. Sometimes people just need a little extra push to get themselves going and this text messaging based program provides an easy means of doing this. By motivating patients using a motivational theory that has proven to be successful in healthcare, patients become empowered to take control of their own health. Patients start to feel better about their abilities and appreciate the support that texting provides them by knowing that someone is understanding of the struggles that they face. This intervention allows providers to do more for their patients without having to put too much effort and with long term consistent use, the patients will hopefully see benefits to their overall health.

DNP Essentials

Seven of the DNP essentials were used in the implementation of this DNP scholarly project (American Association of Colleges of Nursing, 2006). Each essential is addressed here.

DNP Essential I. DNP essential one focuses on the integration of scientific research into new practice which is what this project was. Text messaging had been used in other areas of healthcare to improve health outcomes and walking was shown to benefit patient's with peripheral arterial disease so these two research theories were combined to create this DNP essential. Additionally, all of the research that was done prior to even creating a feasible project for implementation allowed me, the DNP student, to really build a strong foundation of knowledge in peripheral vascular disease and its associated complications/symptoms and primary interventions to combat these manifestations. Gaining this background of information in this area allowed for the development of a new practice approach to manage an existing problem.

DNP Essential II. Essential two was also a big part of this intervention as the goal was to create a program that improved patient outcomes. Doctoral prepared students are able to identify the needs of a target population; this project identified that there was a need for external motivation for patients to complete their walking programs at home and then found a way to help improve this gap. This project created an intervention associated with the current needs of patients and tried to promote ongoing improvement of health outcomes for the patients by promoting walking. This was done in a manner that was cost effective and with no ethical concerns.

DNP Essential III. DNP essential three was the cornerstone of this project as this essential focuses on the critically appraising existing literature and evidence and implementing the best evidence for a particular practice setting. Scholarship and research are hallmarks of doctoral education, research was the foundation to the implementation of this project. Hours and hours of time was spent on finding appropriate research that guided the best intervention to

implement in this setting. The research that was found prior to implementing this text messaging based project all pointed towards the potential benefits of it which is why it was carried out.

DNP Essential IV. Doctoral nursing students are expected to use information technology and technology to support and improve patient care. I saw that text messaging was already in use within this clinic and then saw that there was an opportunity expand on something that the clinic and its patients were already familiar with. Since text messaging is a form of technology that is widely used by most of the patients at this clinic, and all over the world, I tried to create a way to help patients by expanding on something they already knew. This project demonstrated that I had the technical abilities to create and implement a program that was almost fully automated and in line with advancing technological use.

DNP Essential VI. DNP essential six encourages interprofessional collaboration. The methodology for the implementation of this project required dedication from different members of the office team including all of the providers, the office administrator and the medical assistants and this allowed me to work with people of all different knowledge sets and backgrounds at the clinic. I was the leader for the implementation of this project and because of this, I was forced to demonstrate my clear communication skills and collaboration ability with many different individuals.

DNP Essential VII. This project also touches on DNP essential seven which focuses on clinical prevention. The text messaging intervention was created with the goal that it motivated people to walk but also a secondary goal that this walking would benefit their overall cardiovascular health over time. Although the purpose of the pilot study was to see if text messaging motivated patients with peripheral artery disease to ambulate, this was done knowing that walking benefited the health of the patient, otherwise this action would have been pointless.

Any actions taken to improve a patient's health are done with the hope of reducing future complications and illnesses which is what this project aims to do overall for the patient.

DNP Essential VIII. DNP essential eight was also a big part of this DNP project as a whole new intervention was designed, implemented and evaluated in a clinical setting using existing scientific knowledge. Additionally, through the implementation of this project at this particular clinic, I developed relationships with different healthcare professionals to create a program that provided patients with positive health outcomes. Without the support of the providers at the clinic, I would not have been able to implement this project and so creating a partnership with these providers allowed me to help the patients that were involved in this pilot intervention (American Association of Colleges of Nursing, 2006).

Plan for dissemination

The final plan for dissemination of this DNP scholarly project is the final oral presentation that will be done in front of my faculty mentor, my project mentor, as well as the public. Additionally, this project paper will be submitted to the online DNP repository where it can be referenced by future DNP students or anyone who is curious. The outcomes of this pilot intervention were already shared with providers at the clinic where the project was implemented. This project was one that required a significant amount of work and dedication and one that I am proud to have completed. It testifies to my abilities in scholarly research and clinical practice change which are valuable skills as a provider.

Attainment of Personal and Professional Goals

The completion of this DNP scholarly project will mark the completion of achieving a lifelong goal of achieving a doctoral level degree and the completion of my higher education goals. This has been a work in progress for the last four years and all the hours of hard work and

dedication towards this goal will finally be worth it. My professional goal is to use my DNP degree to work as a Family Nurse Practitioner in a primary care setting but to also potentially teach nursing students either at the bachelorette level or even students pursuing their higher education.

References

American Association of Colleges of Nursing. (2006). *The essentials of doctoral education for advanced nursing practice.* https://www.pncb.org/sites/default/files/2017-02/Essentials_of_DNP_Education.pdf

Bäck, M., Jivegård, L., Johansson, A., Nordanstig, J., Svanberg, T., Adania, U. W., & Sjögren, P. (2015). Home-based supervised exercise versus hospital-based supervised exercise or unsupervised walk advice as treatment for intermittent claudication: A systematic review. *Journal of Rehabilitation Medicine, 47*(9), 801–808. https://doi.org/10.2340/16501977-2012

Barbosa, J., Farah, B., Chehuen, M., Cucato, G., Farias Júnior, J., Wolosker, N., Forjaz, C.L., Gardner, A.W., & Ritti-Dias, R. (2015). Barriers to physical activity in patients with intermittent claudication. *International Journal of Behavioral Medicine, 22*(1), 70–76. https://doi.org/10.1007/s12529-014-9408-4

Bearne, L., Holmes, M. G., Bieles, J., Eddy, S., Fisher, G., Modarai, B., Patel, S., Peacock, J.L., Sackley, C., Volkmer, B., & Weinman, J. (2019). Motivating structured walking activity in people with intermittent claudication (MOSAIC): protocol for a randomized controlled trial of a physiotherapist-led, behavioral change intervention versus usual care in adults with intermittent claudication. *BMJ Open, 9*(8). https://doi.org/10.1136/bmjopen-2019-030002

Bentley, A. J., & Kelechi, T. J. (2018). Motivators and barriers to walking in older adults with peripheral artery disease. *Journal of Gerontological Nursing, 44*(1), 43–57. https://doi.org/10.3928/00989134-20170908-01

Centers for Disease Control and Prevention (2019). *Peripheral Artery Disease*. https://www.cdc.gov/heartdisease/PAD.htm

Correa-de-Araujo, R. (2016). Evidence-Based Practice in the United States: Challenges, progress, and future directions. *Healthcare for Women International, 37*(1), 2–22. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4804828/

Davies, M. (2019, March 9). Management of claudication due to peripheral artery disease. https://www.uptodate.com/contents/management-of-claudication-due-to-peripheral-artery-disease

Edmunds, J., Ntoumanis, N., & Duda, J. L. (2006). A test of self-determination theory in the exercise domain. *Journal of Applied Social Psychology, 36*(9), 2240–2265. https://doi.org/10.1002/ejsp.463

Fakhry, F., Spronk, S., de Ridder, M., den Hoed, P. T., & Hunink, M. G. M. (2011). Long-term effects of structured home-based exercise program on functional capacity and quality of life in patients with intermittent Claudication. *Archives of Physical Medicine & Rehabilitation, 92*(7), 1066–1073. https://doi.org/10.1016/j.apmr.2011.02.007

Fischer, H. H., Fischer, I. P., Pereira, R. I., Furniss, A. L., Rozwadowski, J. M., Moore, S. L., Durfee, M.J., Raghunath, S.J., Tsai, A.G., &Havranek, E. P. (2016). Text message support for weight loss in patients with prediabetes: A randomized clinical trial. *Diabetes Care, 39*(8), 1364–1370. https://doi.org/10.2337/dc15-2137

Galea Holmes, M. N., Weinman, J. A., & Bearne, L. M. (2017). ‘You can’t walk with cramp!’ A qualitative exploration of individuals’ beliefs and experiences of walking as treatment for intermittent claudication. *Journal of Health Psychology, 22*(2), 255–265. https://doi.org/10.1177/1359105315600238

Gardner, A. W., Parker, D. E., Montgomery, P. S., & Blevins, S. M. (2014). Step-monitored home exercise improves ambulation, vascular function, and inflammation in symptomatic patients with peripheral artery disease: a randomized controlled trial. *Journal of the American Heart Association, 3*(5), 1–N.PAG. https://doi.org/10.1161/JAHA.114.001107

Gardner, A.W., Parker, D.E., Montgomery, P.S., Scott, K.J., Blevins, S.M. (2011). Efficacy of quantified home-based exercise and supervised exercise in patients with intermittent claudication: a randomized controlled trial. Circulation, 123(5), 491–498. https://doi.org/10.1161/CIRCULATIONAHA.110.963066

Hamburg, N. M., & Balady, G. J. (2011). Exercise rehabilitation in peripheral artery disease: Functional impact and mechanisms of benefits. Circulation, 123(1), 87–97. https://doi.org/10.1161/CIRCULATIONAHA.109.881888

Heart Vascular and Leg Center. (n.d.). *Our Mission*. https://heartandleg.com/vascular-health-mission/

Iso, Y., & Suzuki, H. (2017). Exercise therapy for intermittent claudication in peripheral artery disease. *E-Journal of Cardiology Practice, 13*(34). https://www.escardio.org/Journals/E-Journal-of-Cardiology-Practice/Volume-13/exercise-therapy-for-intermittent-claudication-in-peripheral-artery-disease

Kern, C. (2017, March 30). *Text messaging boosts patient engagement, improves outcomes*. Health IT Outcomes. https://www.healthitoutcomes.com/doc/text-messaging-boosts-patient-engagement-improves-outcomes-0001

Kinnafick, F.-E., Thogersen-Ntoumani, C., & Duda, J. (2016). The effect of need supportive text messages on motivation and physical activity behavior. *Journal of Behavioral Medicine, 39*(4), 574–586. https://www.ncbi.nlm.nih.gov/pubmed/26915963

Lamberti, N., Malagoni, A. M., Ficarra, V., Basaglia, N., Manfredini, R., Zamboni, P., Mascoli, F., & Manfredini, F. (2016). Structured home-bsased exercise versus invasive treatment. *Angiology, 67*(8), 772–780. https://doi.org/10.1177/0003319715618481

Liao, Y., Wu, Q., Kelly, B. C., Zhang, F., Tang, Y.-Y., Wang, Q., Ren, H., Hao, Y., Yang, M., Cohen, J., Tong, J., & Tang, J. (2018). Effectiveness of a text-messaging-based smoking cessation intervention ("Happy Quit") for smoking cessation in China: A randomized controlled trial. *PLoS Medicine, 15*(12), 1–18. https://doi.org/10.1371/journal.pmed.1002713

Liu, X., Sutton, P. R., Sinanan, M. N., Fellner, B. J., Leu, M. G., & Ewell, C. (2019). Evaluation of secure messaging applications for a health care system: A case study. *Applied Clinical Informatics*, *10*(1), 140–150. https://doi.org/ 10.1055/s-0039-1678607

Mays, R. J., & Regensteiner, J. G. (2013). Exercise therapy for claudication: Latest advances. *Current Treatment Options in Cardiovascular Medicine, 15*(2), 188–199. https://doi.org/10.1007/s11936-013-0231-z

McDermott, M. M. (2015). Lower extremity manifestation of peripheral artery disease. *Circulation Research, 116,* 1540–1550. https://doi.org/10.1161/CIRCRESAHA.114.303517

McDermott, M. M. (2017). Exercise training for intermittent claudication. *Journal of Vascular Surgery*, *67*(2), 1612–1620. https://doi.org/10.1016/j.jvs.2017.05.111

McDermott, M. M., Guralnik, J. M., Criqui, M. H., Ferrucci, L., Zhao, L., Liu, K., Domanchuk, K., Spring, B., Tian, L., Kibbe, M., Liao, Y., Jones, D.L., & Rejeski, J. (2014). Home-based walking exercise in peripheral artery disease: 12 month follow up of the goals

randomized trial. *Journal of the American Heart Association, 3*. https://doi.org/10.1001/jama.2013.7231

McDermott, M. M., Liu, K., Guralnik, J. M., Criqui, M. H., Spring, B., Tian, L., Domanchuk, K., Ferrucci, L., Lloyd-Jones, D., Kibbe, M., Tao, H., Zhao, L., & Rejeski, W. J. (2013). Home-based walking exercise intervention in peripheral artery disease: a randomized clinical trial. *JAMA: Journal of the American Medical Association, 310*(1), 57–65. https://doi.org/10.1001/jama.2013.7231

Mears, J., & Kilpatric, M. (2008). Motivation for exercise: Applying theory to make a difference in adoption and adherence. *American Colleges of Sports Medicine's Health and Fitness Journal, 12*(1), 20–26. https://doi.org/10.1249/01.FIT.0000298460.30006.00

Meru, A. V., Mittra, S., Thyagarajan, B., & Chugh, A. (2006). Intermittent claudication: An overview. *Atherosclerosis, 187*(2), 221–237. https://doi.org/10.1016/j.atherosclerosis.2005.11.027

Muench, F., & Baumel, A. (2017). More than a text message: Dismantling digital triggers to curate behavior change in patient-centered health interventions. *Journal of Medical Internet Research*, *19*(5), 1. https://doi.org/10.2196/jmir.7463

Müller-Bühl, U., Engeser, P., Leutgeb R., Szecsenyi, J. (2012) Low attendance of patients with intermittent claudication in a German community-based walking exercise program. International Angiology, 31(3), 271-275. https://www.ncbi.nlm.nih.gov/pubmed/22634982

Murphy TP, Cutlip D.E., Regensteiner J.G., Mohler E.R., Cohen D.J., Reynolds M.R. Massaro, J.M., Lewis, B.A., Cerezo, J., Oldenburg, N.C., Thum, C.C., Goldberg, S., Jaff, M.R., Steffes, MW., Comerota, A.J., Ehrman, J., Treat-Jacobson, D., Walsh, E., Collins, T.,

Badenhop D.T.,…Hirsch, A.T. (2012). Supervised exercise versus primary stenting for claudication resulting from aortoiliac peripheral artery disease: six-month outcomes from the claudication: exercise versus endoluminal revascularization (CLEVER) study. *Circulation, 125*(1), 130–139. https://www.ahajournals.org/doi/10.1161/CIRCULATIONAHA.111.075770

Müssener, U., Bendtsen, M., McCambridge, J., & Bendtsen, P. (2016). User satisfaction with the structure and content of the NEXit intervention, a text messaging-based smoking cessation program. *BMC Public Health, 16*(1), 1–8. https://doi.org/10.1186/s12889-016-3848-5

Popplewell, M. A., Fisher, O., Benson, R. A., & Garnham, A. Atherosclerotic peripheral artery disease: The growing challenge to improve life and limb. *The British Journal of Cardiology, 27*(1), 4–8. https://doi.org/10.5837/bjc2020.s02

Rudisill, H., Kelsberg, G., & Safranek, S. (2011). Effective therapies for intermittent claudication. *American Family Physician, 15*(84), 699–704. https://www.aafp.org/afp/2011/0915/p699.html

Shapiro J.R., Koro T., Doran N., Thompson, S., Sallis, J.F., Calfas, K., & Patrick, K. (2012). Text4Diet: A randomized controlled study using text messaging for weight loss behaviors. *Preventive Medicine, 55*(5), 412–417. https://doi.org/10.1016/j.ypmed.2012.08.011

Shu, J. & Santulli, G. (2018). Update on peripheral artery disease: Epidemiology and evidence-based facts. *Atherosclerosis, 275*, 379-381. https://10.1016/j.atherosclerosis.2018.05.033

Silina, V., Tessma, M. K., Senkane, S., Krievina, G., & Bahs, G. (2017). Text messaging (SMS) as a tool to facilitate weight loss and prevent metabolic deterioration in clinically healthy

overweight and obese subjects: a randomized controlled trial. Scandinavian Journal of Primary Health Care, 35(3), 262–270. https://doi.org/10.1080/02813432.2017.1358435

Storck, L. G. (2017). Policy statement: Texting in healthcare. *Health Information and Management Systems Society.* https://www.himss.org/resources/policy-statement-texting-healthcare

Sylvia, L. G., Bernstein, E. E., Hubbard, J. L., Keating, L., & Anderson, E. J. (2014). A practical guide to measuring physical activity. *Journal of the Academy of Nutrition and Dietetics, 114*(2), 199–208. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3915355/#

Teixeira, P. J., Carraca, E. V., Markland, D., Silva, M. N., & Ryan, R. M. (2012). Exercise, physical activity, and self determination theory: A systemic Review. *International Journal of Behavioral Nutrition and Physical Activity, 7*(78). http://www.ijbnpa.org/content/9/1/78

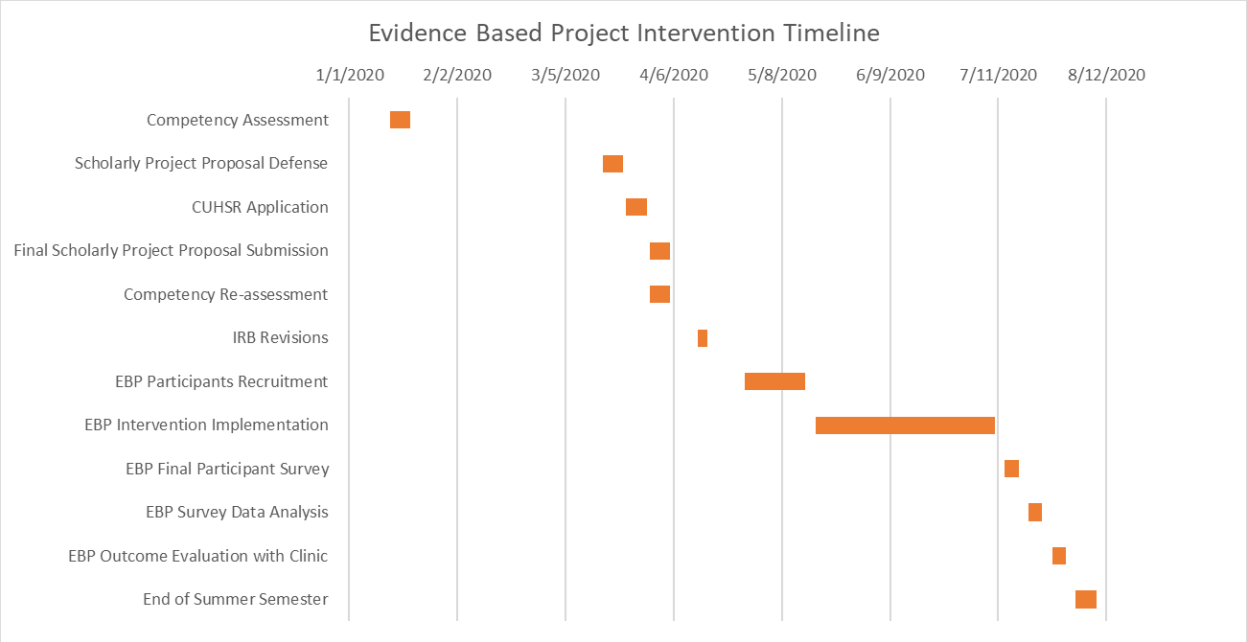
U.S. Department of Health and Human Services. (2017, January 26). Facts & statistics physical activity. https://www.hhs.gov/fitness/resource-center/facts-and-statistics/index.html#footnote-2

Wullink M, Stoffers HEJ, & Kuipers H. (2001). A primary care walking exercise program for patients with intermittent claudication. *Medicine & Science in Sports & Exercise, 33*(10), 1629–1634. https://doi.org/10.1097/00005768-200110000-00003

Ybarra, M., Bagci Bosi, A. T., Korchmaros, J., Emri, S., & Bağci Bosi, A. T. (2012). A text messaging-based smoking cessation program for adult smokers: randomized controlled trial. *Journal of Medical Internet Research, 14*(6), e172. https://doi.org/10.2196/jmir.2231

Appendix A

Evidenced Based Project Timeline



Appendix B

Institutional Review Board Waiver from Heart Vascular & Leg Center

Institutional Review Board Waiver from Heart Vascular & Leg Center of Bakersfield, CA

Bradley University's Doctorate of Nursing Practice/Family Nurse Practitioner (DNP-FNP) program necessitates that students work with a faculty project advisor and an on-site mentor to create an evidenced based quality improvement (QI) project that will benefit physicians/providers, patients, or company stakeholders. DNP-FNP students are required to complete The Collaborative Intuitional Training Initiative (CITI program) prior to implementation of any such QI project. The CITI program is dedicated to earning the public's trust in the research enterprise by providing the student with high quality peer-reviewed, web-based educational courses in research, ethics, regulatory oversight, responsible conduct of research, research administration, and other topics pertinent to the interests of member organizations and individual learners. CITI training ensures that the student develops an ethically sound QI project.

Additionally, prior to the implementation of the QI project that the student, faculty advisor and project mentor create, the project must be reviewed by the Institutional Review Board (IRB) of the clinic in which the project will be implemented. If the institution in which the QI project will be implemented does not have their own IRB, Bradley University's IRB may be used for approval of the project with consent from the administrator of the institution in which the QI project will be implemented. Bradley University's institutional review board is completed by Bradley's Committee on the Use of Human Subjects in Research (CUHSR). This review ensures that when human beings/patients are involved in the QI project, safeguards are established to protect their health, well-being, and rights.

Fify Thomas, a DNP-FNP student of Bradley University, will seek review and approval of her quality improvement project, "Text Messaging to Motivate Individuals with Intermittent Claudication to Ambulate," from Bradley University's CUHSR before implementation of her project at Heart, Vascular and Leg Center of Bakersfield, CA. The administrator of Heart, Vascular and Leg Center of Bakersfield, by signing below, agrees that Heart Vascular and Leg Center of Bakersfield does not have their own IRB and asks that Fify Thomas seek IRB approval from Bradley University's CUHSR prior to the QI project being implemented.

Signature of Heart, Vascular & Leg Center administrator: _____

Printed name of Heart, Vascular & Leg Center administrator: Kimberly Hinsley

Date: 3/20/2020

Signature of Student: Fify Thomas

Printed name of student: Fify F. Thomas

Date: March 20, 2020

Appendix C

Consent

Text Messaging to Encourage Ambulation

You are invited to participate in a quality improvement project in which the purpose is to determine if text messages motivate you to walk to help your claudication related pain.

Procedures Involved

This project consists of text messages being sent to you, the participant, three times per week encouraging you to go on your prescribed walking regimen. If you opt to participate in this intervention, you agree to receiving these text messages on your personal cell phone, at your own cost. Your participation in this project will span over a total of 12 weeks with the first 3 weeks being allocated for participant recruitment and the final week as time for you to respond to a quick survey which will also be sent via text message. The survey will take you no more than 5 minutes.

Potential Risks

There are no foreseeable risks associated with receiving text messages aimed at motivating you to walk. However, it should be noted that you, the participant, are required to make your decision to walk based on your own health status and after evaluating if you believe it is safe based on the situation you are in at the time you plan on walking.

Potential Benefit

The goal of this quality improvement project is that you are motivated to go on walks at least three times per week. ***Walking has been shown to have many positive physical and mental health benefits in addition to being beneficial in alleviating claudication related pain.***

Voluntary Nature of Participation & Compensation

You are voluntarily making a decision to participate in this project. Your agreement to parti**ci**pate in this project is indicated by your signature below and sharing of your cell phone number where you agree to receive text messages. You may skip questions in the survey. There is no compensation for participation. ***Your participation or non-participation will have no effect on your status as a patient at Heart, Vascular & Leg Center of Bakersfield.***

Privacy & Confidentiality

Your participation in the project and the data collected will remain confidential. **The text messages will have no confidential information.** ***Your cell phone number will be entered into an online text messaging service provider but your name will never be shared***. No documentation with your name will leave the clinic. Your responses to the final three-questions survey will be anonymous. The data acquired from the completion of the survey will allow the clinic to know if this intervention is something that patients feel is valuable. Within 6 months of the conclusion of the project, the data will be completely destroyed and the data will not be used for any other purposes.

HIPAA Compliance

This project is in compliance with HIPAA as no participant/patient identifiable information will be shared. Participant identifiable information will solely be used in order to obtain consent to participate/receive text messages. The consent documentation will never leave

the clinic setting. The cell phone numbers of participants will be entered into the online system while the student, Fify Thomas, is at the clinic. Participant name, date of birth, medical diagnosis or any other patient identifiable information will not be entered into the online text messaging service's system.

Fify Thomas, a student of Bradley University will be the student leader of this quality improvement project. Fify Thomas is not an employee of Heart, Vascular & Leg Center of Bakersfield, CA. ***The participant, by signing this consent, agrees that they are okay with Fify Thomas having access to his/her protected health information (name, date of birth, medical diagnosis) and contact information for the purposes of this quality improvement project.***

Your agreement to participate means that you have read and understand the information presented and have decided to participate. Your participation also means that all of your questions have been answered to your satisfaction. If you think of any additional questions, you should contact the student project leader or academic advisor. Questions about this project may be directed to the student project leader, Fify Thomas at ffrancis@mail.bradley.edu or academic advisor, Dr. Judith Walloch at jwalloch@fsmail.bradley.edu.

Printed name of participant: _____

Signature of participant:_____

Cell phone number where to send text messages:_____

Printed name of witness:_____

Signature of witness: _____

Today's date & time:_____

Appendix D

Informational Document for Participants

Text Messaging to Encourage Ambulation

What is peripheral vascular disease (PVD)?

- PVD is a circulatory disease characterized by the narrowing of blood vessels which can reduce blood flow to the lower limbs causing a pain called claudication.

How can you treat PVD?

- Walking has the potential to prevent or minimize PVD and other cardiovascular complications.
- Walking is a primary intervention for people diagnosed with any form of PVD /claudication type leg pain.

Text messaging & Motivation

- Text messaging is an acceptable means for providing motivation to perform a task.
- Texting has increased significantly since the majority of the population now owns a cell phone making texting a powerful health promotion tool
- Texting has shown to be motivational in weight loss & smoking cessation programs. Due to its effectiveness in other arenas of healthcare, texting will now be applied in promoting one's cardiovascular health

What exactly is the project?

- This is a quality improvement project with the goal of improving a one's cardiovascular health.
- Patients will receive three text messages per week motivating them to go on a walk.
- Messages will either be educational or motivational.
- Messages will be sent over 9 weeks
  - In the 9th week, participants will be asked to complete an anonymous survey via text
- No in-clinic follow-up is needed
- Patient will have to sign consent to participate/receive text messages.

Who qualifies?

- Diagnosis of PVD
- Some level of claudication type pain
- Home walking recommendation made by provider at current visit
  - Provider should feel that it is safe for this patient to walk independently
- Should be able to understand/read English
- Access to a cell phone that can receive text messages
  - Should be moderately technologically competent

Appendix E

Text Message Bank

Identified regulation themed motivation – holds outcomes of the behavior to be personally significant

1. Intermittent claudication is a cramping leg pain that develops when walking and is relieved with rest. It is caused by inadequate blood flow to the leg muscles. If you have this pain, you are advised to keep walking, stop smoking, and reduce cardiovascular risk factors.
2. According to the American Heart Association, only 1 in 5 adults get enough exercise to maintain good health, will you be one of these individuals and go on a walk today? Want to learn more: https://www.heart.org/en/health-topics/cardiac-rehab/getting-physically-active/whats-the-link-between-physical-activity-and-health
3. Walking improves the symptoms of peripheral vascular disease in several ways, one is that your circulatory system adapts to your body's needs when you walk regularly. I hope that knowing this gives you the push you need to go on a walk today.
4. Walking regularly can have multiple health benefits, especially cardiac. In people with peripheral vascular disease, walking can help improve leg pain. Make today the day you do something for your health and start the day with a walk!
5. Finding value in taking care of your health is important to wanting to take action to protect your health. Protecting your health is essential to maintaining a good quality of life, walking can help you achieve this goal.
6. One of the the best ways to improve your overall cardiac health is to maintain a healthy lifestyle by exercising regularly, eating well-balanced meals, and maintaining a healthy weight. Walking is helpful in achieving all of these things. Do you have time for a short walk today?
7. If you have peripheral vascular disease or claudication pain, a walking program can be helpful to you. The American Heart Association discusses the benefits of walking until the pain is uncomfortable, stop and rest until the pain goes away, and then start walking again. Gradually, you could increase the time you spend walking

Autonomy – encourages the participant to want to walk by allowing them to feel that they are making the right choice for themselves

1. Walking can bring about positive improvements for your health such as weight loss, improved cholesterol levels, and decreased pain. I encourage you to go on a walk today and take appropriate rest breaks as you need it
2. Participating in exercise/walking has been shown to increase overall walking distance in some patients with intermittent claudication, do you think this can happen for you? Change starts with a walk.
3. There are so many activities you can choose to do but wouldn't it be a great idea to do something to improve your overall health? Walking is a great option.
4. When you go on your walk today, make sure you are remembering to take rest breaks as needed and just enjoy being outdoors and in the moment. Have a great day!

5. Some fresh air would be great; do you agree? Maybe a couple of laps around the block or at your favorite park would be enjoyable?
6. Walking is not always an easy task for everyone but noticeable improvement in pain, cholesterol levels, blood pressure readings, or in weight all take time and a regular commitment to staying active. I know you can do this, go for a walk and help yourself achieve your health goals.
7. The American Heart Association recommends 30 mins of moderate-intensity activity 5X per week, walking can help you achieve this goal! Will you go on a walk today? Follow this link to learn more https://www.heart.org/en/healthy-living/fitness/fitness-basics/aha-recs-for-physical-activity-in-adults -

Relatedness – the feeling of having a personal relationship with another person encourages them to complete the task that is asked of them.

1. I can imagine that going on a walk was probably not going through your mind right at this moment, but I hope you can make time for a walk at some point today.
2. Do you feel that your peripheral vascular disease is limiting your activity level? I know this sounds challenging, but incorporating a regular walking routine into your life will help your symptoms by improving blood flow to the lower extremities and thus improving the pain over time
3. No one wants to be told to exercise, and most of us don't find it to be all that fun, but I can ensure you that walking can have a positive impact on your cardiovascular health. This being said, I hope you take some time out of your day to enjoy a walk! Remember to take rest breaks as needed!
4. It is hard to start any exercise program, especially one that you know will be hard. Walk at your own pace and see how far you go; I will be going on a walk at my own pace today too.
5. I understand that walking might cause you to feel tired or discomfort, I am not brushing this fact aside, but by trying to walk more, you may slowly improve your cardiovascular health.
6. I can imagine how busy you are but there are so many ways that you can incorporate a walk into your routine. Here is a link from the American Heart association suggesting ways to do this: https://www.heart.org/en/healthy-living/fitness/walking/fit-in-walking-morning-noon-or-night
   Will you make time for a walk today?
7. According to the American Heart Association (AHA), walking is one of the most popular forms of exercise. Grab your comfy shoes and go on a walk today. Get some more walking tips from the AHA at this link: https://www.heart.org/en/healthy-living/fitness/walking/why-is-walking-the-most-popular-form-of-exercise

Competence – limiting negative feedback but providing challenging tasks that makes the individual feel they are accomplishing something.

1. When we first met a few weeks ago, we discussed the benefits regular physical activity/walking could have on your health. I just wanted to send you a quick reminder

that walking can help lower blood pressure, cholesterol levels and even help improve lower leg pain, if you have it. A short walk is better than no walk!

2. We've already discussed the potential benefits of walking multiple times: improving lower leg pain, blood pressure levels and cholesterol levels and so now it is up to you to make walking or moderate intensity exercise a regular part of your life. I trust that you will try to do this!
3. I know you already know all the positive benefits of walking for your cardiovascular health so I just want to send a friendly reminder encouraging you to go on a walk today
4. You already know that cardiovascular disease can make walking difficult in some people but did you know that walking can improve your cardiovascular symptoms or play a protective role in your cardiac health? When will you walk today?
5. It is a known fact that smoking cessation is essential for optimal cardiac health. Just as this is true, we know that moderate-intensity physical activity can also have significant benefits for your cardiovascular health. A walk can help you achieve your exercise goals for the day, what do you think?
6. It is recommended to walk for at least 60 minutes per day 5 days per week, but this may be hard, how about starting at shorter increments and slowly building your walking ability?
7. The easy choice would be to not go on a walk today but is this really going to benefit your health? A walk might challenge you but I know you are up for a challenge! Start at your own pace and rest as needed, even a short walk is better than no walk.
8. It would be so easy to just sit down and relax right now, but our goal is to improve your overall health, a quick walk will help with this. I'm sure you agree.
9. The hardest part of exercise is getting yourself to make the first move. However, I assure you that once you start walking, you will not regret the choice you made improve your health today.

Review of the effectiveness of this project

1. Thank you for participating in my project. I hope that my messages were motivating to you and encouraged you to go on walks. Please follow the link to let me know what you thought of this project!
   http://bradley.az1.qualtrics.com/jfe/form/SV_bq5OsFlDY45uXeR

Appendix F

Budget

Budget / Expected Expense		
	Slicktext.com	
April	$	49.00
May	$	49.00
June	$	49.00
July	$	49.00
August	$	49.00
September	$	49.00
October	$	49.00
Total	**$**	**343.00**

Appendix G

Confidentiality Agreement

VIPP, LLC
Confidentiality Agreement

I, the undersigned employee/student of VIPP, LLC, understand that in the course of my business/training with the company and any other entity under VIPP, LLC, Silver Summit, Oak Hills Medical Corp., I may have access to and become acquainted with information of a confidential, proprietary or secret nature which is or may be either applicable or related to the present or future business with the company, its research and development, or the business of its patients, physicians, referring physicians, and/or co-workers. Such trade secret information includes, but is not limited to, devices, inventions, processes, compilations of information, records, specifications and information concerning physicians, referring physicians, patients, vendors, and/or co-workers.

I agree that I will not disclose any of the above mentioned trade secrets, directly or indirectly, or use them in any way, either during the term of my employment or at any time thereafter, except as required in the course of my employment/training with the company.

I understand that I must comply with the regulations that the Health Information Portability and Accountability Act (HIPAA) has adopted by the Federal Government. I agree to attend and comply with all HIPAA education programs. I understand all Personal Health Information (PHI) of patients, physicians, co-workers, and referring physicians is to be kept strictly confidential. I agree that the only proper way to dispose of any confidential information is in the shredder. I understand that I must report any HIPAA or PHI violation immediately to the clinic manager or an executive officer of the company.

I understand and agree to comply with all policies, procedures, and regulations regarding HIPAA, and all confidential information of the company and all other entities associated under VIPP, LLC. I further understand that my employment/training may be terminated if I do not comply with this agreement and/or confidential/HIPAA polices or procedures implemented by the company.

Fifty Thomas	student	Bakersfield CA
Print Name	Dept.	Location
Fifty Thomas		3/4/20
Signature		Date
		3/4/20
Witness Name		Date

Revised 11/2017 – HR Dept.

Appendix H

Survey Results