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Community Based Walking Program for Patients with Cardiovascular Disease in Robeson County, NC

Statement of Need

Cardiovascular disease is a very broad term that incorporates any disease that affects the heart and/or the vascular system.<sup>1</sup> It is primarily due to the development of atherosclerosis, a condition where there are large, hard plaques in blood vessels that impede blood flow to body organs.<sup>1</sup> Hypertension and peripheral artery disease are common conditions that result from the formation of atherosclerosis.<sup>1</sup> These blockages in blood vessels can stop flow to important organs such as the brain and the heart, which can lead to a life threatening conditions such as stroke or a heart attack.<sup>1</sup> Nationally, cardiovascular disease has consistently been the number one cause of death in the United States, with 31.9% of deaths being caused by a cardiovascular condition in the last year.<sup>2</sup> Currently, the financial burden of heart disease is the highest of all chronic conditions; for 2014, the total cost was found to be 315.4 billion dollars (both direct and indirect costs included).<sup>2</sup> The cost has been predicted to triple in the next 15 years and it is projected that 43.9% of the population will have some type of cardiovascular disease in the year 2030.<sup>2</sup>

At a local level, Robeson County has been severely impacted by the effect of cardiovascular disease. Compared to the rest of North Carolina, Robeson County has higher rates of cardiovascular disease, and this disease accounts for 248.1 deaths per 100,000 deaths within the county.<sup>3,4</sup> High blood pressure is the most prevalent condition, with about 35% of people indicating that they had been diagnosed with this condition.<sup>3</sup> To make matters worse, Robeson County has consistently been ranked in the bottom five for overall health factors and health outcomes in the state of North Carolina.<sup>5</sup> The lack of wellness services, recreation facilities and

safe places to walk contribute to the lack of overall physical activity within this county and is contributing to the high incidence of cardiovascular conditions.<sup>3</sup>

A sedentary lifestyle is one of the primary risk factors for the development of cardiovascular disease that may lead to a stroke or heart attack.<sup>2</sup> Studies by the American Heart Association show that people are spending more time in front a computer or television than exercising.<sup>2</sup> Moderate physical activity has been associated with a decreased risk of stroke and heart attack; however, only 20.7% of adult Americans meet this requirement.<sup>2</sup> In Robeson County, only 31.9% of people are getting the recommended amount of physical activity each week (150 min of moderate physical activity/week).<sup>4</sup> The impact of physical activity on cardiovascular disease has been so great that this year, the Surgeon General has created a national call to action initiative that promotes 30 minutes of walking a day for every American in order to decrease risk for chronic disease (“Step it Up”).<sup>6</sup> There is a plethora of research that supports that physical activity is not only protective against deadly cardiovascular events, but it also helps decrease the risk for other chronic diseases, such as obesity and diabetes.<sup>7</sup>

A community based walking program that provided education about cardiovascular disease as well as structured exercise would address the lack of physical activity in Robeson County and decrease the risk of mortality associated with cardiovascular disease. Furthermore, it would also decrease the financial burden of the disease; it has been found that walking programs save from \$14,000 - \$69,000 a year in healthcare costs.<sup>2</sup> However, in order for this program to gain popularity and enable citizens to create a life long change, the concepts of the social ecological model should be taken into consideration. The social ecological model (SEM) states that there are individual and environmental factors that need to be addressed in order for a person to attain a positive health behavior change.<sup>8</sup> Specifically, this includes how public policy,

community factors, institutional factors, interpersonal factors (relationships with others) and intrapersonal factors (personal beliefs, attitudes) affect a health behavior change.<sup>8</sup> For example, the walking program would be addressing the community factor by providing a safe, local and accessible place for people to walk at that is close to their home. Another example of community effect is having the program publicized at local hospitals/clinics and be endorsed by public officials and trusted health providers in order for it to gain support, credibility and relevance to the people of Robeson County. It would also affect the interpersonal level, as the weekly interactions between the group members and group leaders would create a social support network that will provide accountability and encouragement throughout the program. Finally, the educational information, promotion of self efficacy and personal goal setting will provide the intrapersonal motivation necessary for people to establish and continue their physical activity habit after completing the program.

Cardiovascular disease is the number one cause of death in America. At the national level, physical activity has been underlined as way to mediate the costly effects of this disease. Locally, the people of Robeson County recognize the impact of cardiovascular disease in their community and desire information and programs about physical activity.<sup>3</sup> Not only would physical activity affect cardiovascular disease, but it would also improve outcomes in other chronic conditions that are rampant in this county, such as obesity and diabetes.<sup>5</sup> A physical therapist led, community based walking program targeted to people with cardiovascular disease would promote exercise and healthy habits and thus mediate the effects of cardiovascular disease.

## Background

As stated before, physical activity for 30 minutes a day has become a national initiative and has the potential to save thousands of dollars. Many cities have already established community-walking programs and have achieved great results. For example, the 8-week Walk Your Heart to Health in Detroit, MI was found to significantly decrease variety of risk factors associated with cardiovascular events, such: systolic blood pressure, total cholesterol levels, fasting blood glucose, waist circumference and body mass index (BMI).<sup>9</sup> They also found that these results were maintained 24 weeks later.<sup>9</sup> This program consisted of meetings that occurred three times a week at multiple community locations.<sup>9</sup> Paid health promoters (that were from the local community) led participants in 45-90 minutes of walking (total walking time would gradually increase each week).<sup>9</sup> These group leaders were also integral in promoting group adhesion and providing encouragement and motivation for health change.<sup>9</sup> Furthermore, participants were provided pedometers to track their daily activity.<sup>9</sup> Researchers found that there was a significant increase in steps recorded per day after the completion of the intervention compared to baseline.<sup>9</sup> They also found that adherence to the program was important in increasing overall physical activity; participants increased their steps per day with each additional session they attended.<sup>9</sup> Overall, this research demonstrates the effectiveness of providing a structured walking program (led by trained community representative) on reducing cardiovascular risk and also improving overall physical activity.

As previously mentioned, education about the benefit of physical activity on cardiovascular disease and participant adherence to a program is also necessary for the program to have an effect. According to the Health Belief Model, a person needs to understand the severity of their disease and be aware of their likelihood of a having a dire event (such as stroke

or heart attack.<sup>10</sup> Furthermore, they must understand the benefit of changing a behavior and learn how to overcome barriers to completing the behavior change.<sup>10</sup> Also according to the model, promoting self-efficacy, creating personal goals and providing social support are also needed to establish a new health behavior.<sup>10</sup> The HUB City Steps was a 6 month intervention that integrated components of this theory to promote lifestyle change in the southern, African American population. At baseline, trained researchers led motivational interviewing sessions with each participant where they discussed the participant's "numbers" (glucose, BMI, blood pressure), established individualized goals and created a health plan specific to that person.<sup>11</sup> By addressing the person's individual data, the participant is able to understand the severity of their disease. With the use of motivational techniques, participants are able to understand what physical activity will do for their disease risk and create goals to change these numbers.<sup>11</sup> In this study, the motivational interviewing sessions occurred again at the 3-month and 6 month assessment mark.<sup>11</sup>

The second part of this intervention included social support meetings where trained community leaders initiated discussions about achieving goals, promoting physical activity and encouraged participants to continue to be adherent to their pedometer diaries.<sup>11</sup> These group leaders were also in charge of calling participants when they did not attend a session.<sup>11</sup> Finally, there were 5 educational sessions throughout the 8 weeks that were led by community health professionals and included information about diet, nutrition and physical activity.<sup>11</sup>

Finally, although the HUB program did not have participants specifically walking at each session, they did provide participants with pedometers and encouraged participants to record their number of daily steps in a pedometer journal that would be turned in at each weekly session.<sup>11</sup> They found that participants who had greater educational session attendance and

increased pedometer tracking activities had significant decreases in BMI, LDL levels, body fat percentage, and significant increases in steps taken per day.<sup>11</sup> This study underlines the importance of including educational information, tracking pedometer use and promoting adherence (through phone calls, social support etc.) for the efficacy for a community based walking program.

A pedometer is a small, inexpensive device that tracks a participant's movement and records the number of steps a person takes over a period of time. The pedometer works on an intrapersonal level and provides a participant immediate feedback about their progress toward a specific walking goal. One research study looked at the effect of pedometer use over the course of one year in community dwelling elderly people. Each participant was given a monthly step goal that they were expected to reach based off baseline pedometer use and wore the pedometer for at least 12 hours a day. The mean steps taken per day increased to 10,000 steps at 21 weeks and this level was maintained at the final assessment (59 weeks). At the 21-week and 59 week mark, there were significant findings for a decrease in BMI, insulin levels and systolic blood pressure as well as an overall increase in HDL cholesterol. There continues to be strong evidence that supports the use of pedometers to not only significantly increase physical activity, but also significantly decrease blood pressure as well as BMI, both important risk factors for cardiovascular events.<sup>12,13</sup>

Cardiovascular disease has become an epidemic both nationally and within Robeson County. A community-walking program that integrated the concepts of social ecological theory and health belief model would enable participants to not only begin but also maintain their increase in physical activity. According to the previously stated evidence, a community walking program should include the following: the use of a pedometer and daily tracking of use,

educational sessions about how to manage cardiovascular disease, group leaders from the community trained in promoting self efficacy, providing accountability and promoting group cohesion. Physical activity has been linked to decreasing mortality rates and previous community walking programs have been successful in making valuable differences in cardiovascular risk factors.

### Program Objectives

The primary mission of this walking program is to improve the overall physical and cardiovascular health of participants by providing education, social support and structured physical activity for 150 min/week. By focusing on this mission, participants will be able to improve their overall physical health and decrease risk of dangerous cardiovascular events in a concrete way. The following introduce the primary objectives of the program that will provide concrete evidence that the program is reaching its intended mission.

Throughout the program, participants will have pedometers and a tracking journal they will use to self-monitor their physical activity each day. Pedometers have been found to be successful in increasing physical activity levels and related to improvements in BMI, cholesterol, and systolic blood pressure.<sup>13,14</sup> Furthermore, taking 10,000 steps per day has been associated with improvements with cardiovascular risk indicators such as blood pressure.<sup>15</sup> Participants should be averaging 10,000 steps/day by the end of the 36 week period as indicated by their daily tracking log in order to demonstrate moderate physical activity throughout the day.

The 6 minute walk test (6MWT) is commonly used in cardiovascular rehabilitation to assess cardiovascular endurance and exercise tolerance.<sup>16</sup> Improvements in the 6MWT score has been correlated with improvements in overall endurance for daily life activities.<sup>17</sup> Exercise has been found to improve cardiovascular endurance ability and the minimal detectable change

related to this measure has been found to be 54 m.<sup>18</sup> Therefore, an objective for this program is that participants will be able to increase their distance walked by 54 m on the 6MWT at the end of the 36 week program.

A common risk factor for a cardiovascular event is elevated blood pressure.<sup>19</sup> Almost 40% of citizens in Robeson County have been diagnosed with hypertension.<sup>5</sup> Exercise has a significant effect on blood pressure in patients with hypertension. Ideally, participants would be able to decrease their blood pressure levels below hypertensive level, which is 140/90. However, similar walking program intervention have typically found a 10 mmHg change in systolic blood pressure.<sup>19</sup> Therefore, another objective of this program would be that participants would decrease their overall systolic blood pressure by 10 mmHg within the 36-week time span.

Waist circumference is a measure of abdominal fat storage and has been associated with and increased risk of coronary heart disease, mortality and diabetes.<sup>20</sup> A 1 cm decrease in waist circumference reduces the risk for a cardiovascular event (i.e. stroke, heart attack) by 2%.<sup>19</sup> A meta-analysis has found that participating in a walking program is associated with a 1.5 decrease in waist circumference.<sup>19</sup> During the program, participants will also be receiving educational information about nutrition and diet changes that can aid them in losing weight and thus lowering their waist circumference. Therefore, another program objective will be that participants will have a 1.5 cm decrease in waist circumference from pre to post assessment at 36 weeks.

Program adherence is important for maintaining exercise as a habit. Increased adherence ensures that participants are getting their 150 min/week of exercise and also has been shown to improve the other objective measures of cardiovascular risk factors such as blood pressure and BMI.<sup>11</sup> Therefore, we expect participants to attend at least 54 out of the 108 sessions over the 36

-week period to ensure appropriate participation for a change in cardiovascular health.

In order to assess change in patient knowledge about cardiovascular risk factors, lifestyle changes and signs of symptoms of a potential stroke/heart attack, a pre, midterm and post assessment will be administered to participants. An increase in this score should indicate that participants are aware of serious signs and symptoms that require immediate emergency attention and have increased knowledge about their condition from the education sessions.<sup>21</sup>

### Methods

The walking program will occur over a 36-week period at a local high school in Robeson County. By doing it at the high school, most people will be familiar to the location and the program will be able to relocate to the gymnasium in case of inclement weather. Furthermore, education sessions and discussion groups can be done in the high school classrooms. The program will begin over the summer months so that the gymnasium will be available and also so that weather will not derail participants from attending. Childcare will also be provided at this time so that participants with children will be able to attend. The program will meet three times a week (Monday, Wednesday, Friday) for 50-75 minute sessions, which will always include a minimum of 40 minutes of walking led by a trained group leader (40 minutes will include a warm up and cool down session and time walking will increase with program progression). At the beginning of each week (Monday), there will be a 30-minute educational session before the walking program where participants will learn about their condition and lifestyle changes they can consider to improve their condition. At the end of each week (Friday), group leaders will lead a 20-minute discourse where participants will discuss current health goals and create tangible steps to achieve these goals.

During the initial introductory session, the head physical therapist and the community group leaders will set up different stations for the different pre-assessment measures (6 minute walk test, waist circumference and blood pressure) and participants will also undergo a medical chart review. Group participants will be provided a pedometer and a tracking journal to record how many steps they are taking at the end of the day. Based on the number of participants, individuals will be put into groups based on their initial fitness levels and familiarity with exercise. Group leaders will introduce participants to each other and each participant will share a health goal they want to achieve over the next 36 weeks as well as plans to achieve the goal. The group leader will write this information down as part of the participant's file for future group discussions. Individuals will get a general overview of the program's structure and will learn how participation in the program will improve their cardiovascular health. They will also be learn about potential prizes for achieving the program objectives, such as t-shirts or discounted gym memberships.

Each Monday session will begin with a group educational session. Increased participation in educational sessions has been found to improve BMI and decrease sugar intake in participants with cardiovascular disease.<sup>11</sup> The educational session will cover topics such as healthy eating, daily activity, how to monitor vitals and special topics concerning exercise, such as footwear and clothing. Experts from the community (such as registered dietitians, nurses, pharmacists etc.) can become involved as leaders for these educational sessions.

The walking groups will have a set trajectory around the high school track or within the neighboring community and will be led and paced by a group leader. These leaders will be highly motivating and enthusiastic and will be trained on how to promote social cohesion and self efficacy within the group.<sup>22</sup> There will be an adequate warm up and cool down completed

during each session. During the cool-down sessions, the group leaders will lead an informal discussion where participants can share how they felt during the daily exercise and troubleshoot any questions the participants have about that week's educational session.

More in depth, 20-minute group discussions will occur every Friday and will include specific discussion questions. During these planned group breakout sessions, participants will discuss barriers to reaching their health goals for that week and also brainstorm methods to overcome these methods.<sup>10</sup> The group leader will also be reviewing the pedometer step log during this time to ensure that participants are either reaching the 10,000-step goal or increasing the number of steps they have taken each week. Group leaders will be well versed in promoting self-efficacy in participants to allow them to reach their health goals using techniques such as verbal persuasion and social modeling (they will be responsible for having their own health behavior goal as well). Group leaders will hold participants accountable to the goals they have created and will also learn motivational interviewing techniques to assist participants in reaching their fitness goals and the final objectives. They will also be in charge of calling participants who have missed a session to encourage attendance. An enthusiastic group leader that is available to the participants and will promote social group cohesion will improve participant adherence to the walking program and thus allow participants to reach the final program objectives.<sup>22</sup> The head physical therapist will float in between the groups during this time and will be available for group leaders/participants in case any questions come up.

At the final group session, participants will complete post-assessments and see if they were able to complete the final program objectives. Furthermore, participants will be able to share their personal health goal achievements. Rewards will be handed out to participants who are able to complete the program objectives.<sup>23</sup> Furthermore, individual groups will discuss ways

that they will continue the health habits after the program's completion by creating concrete plans for continued involvement in exercise.<sup>23</sup>

In addition to final outcome assessments, midterm assessments will be conducted as well. By completing a midterm assessment, participants who are not progressing appropriately can be targeted by group leaders to discuss what potential factors (i.e. program adherence, nutrition, psychological distress etc.) could be contributing to the lack of progress. By addressing these potential issues at midterm, the participant can create the changes needed to reach the final goals. In addition to these outcome measures, participants will also complete midterm and final feedback surveys. The information from these surveys will help group leaders and the head physical therapist better organize the program structure and provide for the participants' needs.

### Program Evaluation

Based on the previous evidence, this type of program is needed and would be feasible to conduct in Robeson County.<sup>24</sup> A program evaluation is an essential key to establishing a program's efficacy in achieving its outcomes and promoting change to better serve its participants.<sup>24</sup> Because this is a relatively new program, the purpose of a program evaluation at this stage is to determine how the program can be changed in order use time effectively, be more cost efficient and most importantly, how the program can better meet the needs of its participants and allow them to reach the program goals.<sup>24</sup> A proper program evaluation should include feedback from the important "stakeholders" of the program; in this case, that would be the head physical therapist, the group leaders and the participants (which will occur through feedback from written survey).<sup>24</sup> Every Friday, a group leader meeting will be held to communicate any changes that may need to occur for the upcoming week and to troubleshoot any issues that arise

during sessions. However, formal midterm and final outcome data will be analyzed and compared to the aforementioned program objectives in order to determine if the program was successful. Both the midterm and final evaluation of the program will occur by gathering data on the participant's cardiovascular health, pedometer use, adherence to program sessions and participant/group leader feedback surveys.

The participant feedback surveys will include questions about the participant's general satisfaction with group leaders, education sessions, walking time, program structure and overall program. It will also provide an open space where participants can discuss suggestions on how to improve the program or what they feel the program is lacking. The group leaders will also fill out feedback surveys and provide information about logistical concerns, communication within their group/with the head physical therapist, and information/skills that would have been useful to learn in the training sessions. Using the information from group leaders and feedback from participant surveys changes to the program structure (i.e. needing more discussion time, needing new pathways to walk etc.) may be required to allow for more efficient use of time. Furthermore, changes to the how/what type of education is presented may need to be made in order to make the information relevant.

To determine physical fitness and cardiovascular health, the use of the 6MWT, blood pressure measures and waist circumference are to be utilized. In order to reach a clinically meaningful difference for the 6MWT (based on community dwelling adults), participants should be able to increase their walking distance by 54 m by the end of the program. For cardiovascular risk factor measurements, a 10 mmHg drop in systolic blood pressure is expected upon the completion of the program and a waist circumference decrease of 1.5 cm should be expected at the end of 36 weeks. For patients who are not experiencing decreases in blood pressure or waist

circumference or an increase in walking distance at midterm, an individualized discussion can occur about potential medication changes, physical health problems, environmental changes or psychological distress that could be contributing to the lack of change. Furthermore, program adherence will be assessed at both midterm and final assessment times as well. For those who are showing poor adherence, communication should occur between the participant and the group leader and a follow up survey about why the participant is not attending/not frequently attending should be sent to the participant to determine the cause for lack of adherence. Pedometer diaries will also be evaluated at midterm to see if participants are effectively using them and to see if it is actually making an impact in achieving the 10,000 steps a day goal. Satisfaction with pedometers will be assessed through the feedback surveys and provide the necessary information about whether or not the cost of pedometers for future programs is justified. Rewards for completing all the final objectives will be publicized throughout group meeting sessions and will be handed out during the final program session.

Limitations:

In order for this program to be successful, there needs to be a large amount of community participation; from experts to teach educational sessions, to community group leaders, to people who are willing to provide childcare and most importantly, participants. It may be difficult initially to get people interested in the program and commit to attending to the program three times a week. Having community group leaders is especially important, as they are essential in making participants feel accepted, comfortable and for improving overall adherence. Unless a monetary incentive can be provided for these community group leaders, they may not be able to dedicate the time and effort into attending training sessions and leading a group three times a

week. If there are only a few community group leaders and a large number of participants, discussion group sizes may be larger and participants may not receive the individualized attention they need. Another logistical limitation is potential use of the high school; it may be limited due to other high school summer activities and therefore meetings may be cancelled frequently.

Another limitation is that the pre and post outcome measures (i.e. blood pressure waist circumference) can be affected by factors such as a poor diet, medication changes or psychosocial factors that are not directly addressed during the program. Although there will be educational sessions that discuss these various factors, without follow up, there may not be actual behavior change in these realms. Therefore, a lack of change in outcome measures, may be influenced by a by confounding factors and potentially diminish the possible effect of the walking program.

### Conclusion

A community based walking intervention for adults with cardiovascular disease will directly address the leading cause of death for adults in Robeson County.<sup>3</sup> This program is being done at a local, safe location, provides childcare and is free to the general public, making it accessible to a large population. The use of community leaders to lead group sessions and walking groups will promote greater culture tailoring and make participants feel included in the group.<sup>25</sup> This community-walking program is in line with local community health goals set out people of Robeson County as well as federal initiatives designated by the Surgeon General.<sup>3,6</sup> The social support, extrinsic motivation, education pedometer use and structure of this walking program (meeting 3 times a week) will affect health behavior of the participants on a variety of different levels. This walking program will enable participants to get the appropriate skills and

support to understand and manage their cardiovascular condition and avoid serious, life-threatening events cardiovascular events.

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