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Implementing the TEXTMe Cardiovascular Mobile Health Intervention in Detroit, Michigan

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The document mentioned above has been reviewed and accepted by the student's advisor, on behalf of the advisory committee, and by the Director of Graduate Studies (DGS), on behalf of the program; we verify that this is the final, approved version of the student's capstone including all changes required by the advisory committee. The undersigned agree to abide by the statements above.

Melissa Horton, Student

Dr. Marc Kiviniemi, Committee Chair

Dr. Sarah Wackerbarth, Director of Graduate Studies

IMPLEMENTING THE TEXTME CARDIOVASCULAR MOBILE HEALTH INTERVENTION IN DETROIT, MICHIGAN

CAPSTONE PROJECT PAPER

A paper submitted in partial fulfillment of the
requirements for the degree of
Master of Public Health
in the
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By
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Hebron, KY

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Abstract/ Summary

Cardiovascular disease is currently the leading cause of death in the United States. One of the cities with the highest rates of cardiovascular disease is Detroit, Michigan. Those diagnosed with cardiovascular disease are encouraged to make lifestyle modifications to improve their health. However, if cardiovascular disease is not managed, it can lead to serious health outcomes such as stroke, heart disease, and death. The TEXTME program is designed to send randomized text messages to participants to encourage lifestyle changes around diet, exercise, and smoking cessation. Participants in the program will be recruited from three health clinics located in the city of Detroit, Michigan. To determine if behavioral and lifestyle changes occur after participants are finished with the six-month program, they will complete several questionnaires related to self-efficacy changes and lifestyle changes. Additionally, biological information will be pulled from medical charts to determine if there are any biological changes. The intended outcomes from this program include increases in self-efficacy for participants surrounding exercise, diet modifications, and smoking cessation, improved knowledge about cardiovascular disease, and improvement in quality of life.

Target Population and Need

Cardiovascular disease is the leading cause of death for Americans, averaging about 655,000 deaths a year, amounting to one in four deaths each year caused by heart disease [1]. Lifestyle plays an essential role in developing heart disease, with common risk factors including smoking, high blood pressure, poor diet, lack of exercise, and high cholesterol [1]. Men are disproportionately more likely to suffer from cardiovascular disease, with rates being higher among minority populations. The highest rates of cardiovascular disease appear in the Midwest, with Detroit, Michigan having one of the highest rates of cardiovascular disease in the country [1].

After a diagnosis of cardiovascular disease, an individual can control the disease by taking proper precautions to stay healthy. This includes modifying lifestyle choices such as changing diet, increasing physical activity, and medication adherence. Therefore, it is important to help patients diagnosed with cardiovascular disease make lifestyle changes to improve their quality of life.

In 2017, the Detroit Health Department and several community partners in the area began a community needs assessment, with the results being released in 2019. This community needs assessment is a part of the Improving Detroit Project. The overarching goal is to determine what resources and services are needed in the city to improve health and well-being. This community needs assessment included results from over 2,000 Detroit residents. With the extensive work and information gained from this needs assessment, it is apparent that there is a need for improvement in health resources in the city [5]. Additionally, the Henry Ford Health

System released a community health assessment 2019 and detailing the findings from its hospital settings. This health assessment's conclusions outlined the need for additional support and heart health resources in the city.

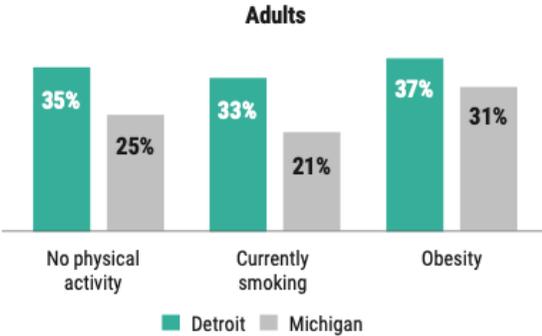
City of Detroit

The city of Detroit comprises 139 square miles of land and had a population of 651,812 residents in 2018 [5]. Detroit is a diverse city; the breakdown of race in the city is 83.2% African American, 14.4% White, 7% Asian and Pacific Islander, and 0.7% Native American. In addition, ethnicity is noted as 8.4% of the population identifying as Hispanic or Latinx [5]. These demographics are noticeably different from the rates in the state of Michigan and the United States. In Michigan, 79% of the population is white, 14.1% is Black, 3.4% is Asian, and 0.7% is American Indian/ Alaskan Native [9]. In the United States, the demographics consist of 76.3% white, 13.4% Black, 1.3% American Indian/ Alaskan Native, and 5.9% Asian.

In 2018, there were 2,173 deaths related to heart disease identified in the city of Detroit. When adjusted for age, the city's rate of cardiovascular disease is 8.4 percent, making Detroit one of the cities with the highest cardiovascular disease rates [5]. Because of the high rates of cardiovascular disease in Detroit and the rest of the state, the leading cause of death in Michigan is heart disease. From 2012-2016, the age-adjusted death rate for cardiovascular disease increased to 200.8 per 100,000 deaths in Detroit [6]. Disparities are present among the death rate, such as black individuals have a higher death rate related to heart disease than white individuals, with 80.7 more deaths per 100,000 than white individuals [7]. There are also disparities in life expectancy. In Michigan, the life expectancy is 78 years, while in Wayne

County (the county Detroit is located in), the life expectancy is 75 years. However, Detroit's life expectancy is only 72 years [5], a six-year difference from the average in the state of Michigan.

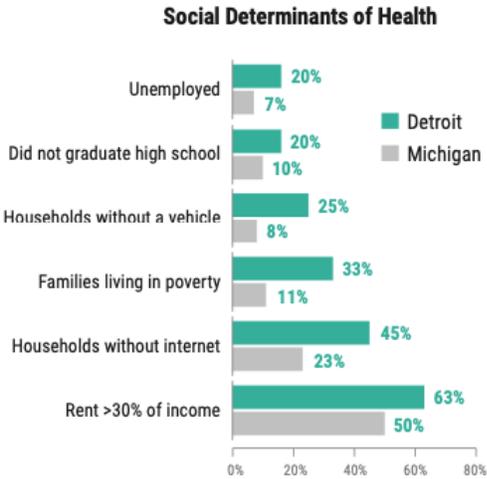
According to the Henry Ford Health Systems Community Health assessment, the rate of obesity and cigarette smoking increased in Detroit between 2013-2016. The estimated prevalence of obesity was 37.2%, and cigarette smoking was estimated as 32.8%; both rates are



Source: Michigan Behavioral Risk Factor Surveillance System (2014-2016)

higher than the national average and higher than the rates in the state of Michigan. The estimated prevalence of no leisure-time physical activity decreased during 2012-2016 but was still higher than the national average and the state of Michigan at 34.7%. [7] These same results are consistent with the

Michigan Behavioral Risk Factor Surveillance System report from 2014-2016, with those results published in a graph above. Additionally, it was reported by the Henry Ford Health System that an estimated 11.4% of residents of Detroit were told that at some point that they had cardiovascular disease.



Source: American Community Survey (2013-2017)

Social Factors

The city of Detroit also has high rates of many social factors that lead to adverse outcomes such as education status, poverty, and employment status, with rates of each of these factors being higher in the city of Detroit than in the state of

Michigan as outlined in the graph above [5]. For example, unemployment rates in Detroit are double the rate in the state of Michigan. Unemployment rates are 20% in Detroit, while only 10% in Michigan [5]. The same is also true for educational attainment; 20% of Detroit residents did not graduate high school while only 10% of those in the state of Michigan did not graduate high school. However, the rates of poverty in Detroit are much higher than in the state. The rate of poverty in Detroit is 33%, with only 11% in Michigan.

Additionally, in Detroit, the rate of uninsured residents is higher than in the rest of the state. The state of Michigan has a rate of 7% of the residents that do not have health insurance; in Detroit, the rate is higher at 12% [5]. There are also many disparities related to income in Detroit; 25% of households do not have a vehicle, 45% of households do not have Internet, and 63% of residents' rent was more than thirty percent of their income [5].

Unfortunately, for those that have already been diagnosed with cardiovascular disease, the only treatment is managing the disease. To help with this problem, the Detroit Health Department plans to implement a mobile intervention in the community. The intervention will work to help improve physical activity, diet, and lifestyle behaviors. By changing attitudes about diet and exercise, it is possible to improve the life expectancy and quality of life for participants.

Programs in Detroit

The city of Detroit has worked to help reduce the structural disparities that exist within the city. One approach the city has taken is creating community gardens and green spaces in neighborhoods throughout the city [5]. This allows access to fresh fruits and vegetables that are

not attainable to some residents in the city. Additionally, one of the farmers markets in the area, Eastern Market, allows residents to attend free cooking classes.

Although these resources exist and can help improve residents' health in the community, there is still a need for individual behavior change. Therefore, the proposed intervention that will be implemented in Detroit will include resources such as community gardens to help individuals be healthy.

Additionally, several health care organizations are committed to helping patients with cardiovascular disease. This includes the Henry Ford System that has ranked obesity, physical activity, and smoking as one of its top three health goals for 2019. There is also the Detroit Clinic that is available for individuals that cannot afford medical care. In addition, the Detroit Clinic offers counseling for those with cardiovascular disease.

Proposed Intervention

One such approach to helping those with cardiovascular disease is implementing a mobile texting intervention in the city among those diagnosed with cardiovascular disease. With heart health being a major issue in Detroit, the intended intervention is an adaptation of the TEXTME program developed in Australia. This program works by sending text messages to participants to remind them to exercise, eat healthily, gain knowledge about cardiovascular disease and provide resources and guidance to quit smoking [2]. This intervention will build upon other resources such as the community gardens in Detroit by encouraging using these resources and working toward a behavior change among the participants. The research team will comprise a list of community resources available in each neighborhood using results from the community health assessment to make sure that the program is tailored to individuals and

fits their needs. Since this intervention does not require any outside resources other than staffing, it will be an excellent addition to the community's existing programs and resources.

This mobile program will be working with other agencies to help provide guidance for the intervention and ensure the materials provided are correct. The American Heart Association of Detroit will work with the Detroit Health Department to provide guidance on the intervention and model the messages used. Since this program was initially developed in Australia, it is imperative to make sure the recommendations are appropriate for what is recommended in the United States. This program will recruit participants from three hospitals and clinics throughout the city; this process will be expanded upon in the program approach section.

The program's reach will begin small in the first year to ensure that the program will run effectively. For each of the three settings that the intervention will be implemented, researchers will try to recruit around 30-40 participants in each setting that will be enrolled in the program for a six-month period. This will allow for a variation in participants and allow for a comparison to occur between them. The second year's goal is to have between 340-360 participants signed up for the program in each of the settings. By the end of the third year, the goal is to have another 360 participants in the program. The three settings used for recruitment are located in different areas in the city to make sure the intervention targets different groups. The goal is to have participants receive the intervention for six months to help establish a regular pattern. After the program's initial set-up, participants will be recruited on an ongoing basis. Since this intervention is being established in a new setting, the goal is to recruit as many participants as possible. The original intervention aimed at 720 participants. This intervention

targets fewer participants since all participants will be receiving the intervention, and this intervention will continue to recruit participants throughout the intervention period.

To ensure that the program effectively helps the community, researchers will reevaluate the study results. In addition, any community needs assessments that are released to ensure the program is effective and meets the necessary goals intended. For example, the Henry Ford Health System completes a community health assessment every three years, with one of the areas being evaluated in Detroit. Since this health assessment will be completed during the second year of the TEXTME intervention, results from the assessment can be used to determine if there is an impact from the intervention.

Program Approach

The Community Preventive Services Task Force recommends telehealth interventions for those diagnosed with chronic diseases to help manage these conditions, including those recently diagnosed with cardiovascular disease and those who have had cardiovascular disease for a long time [8]. Telehealth can include many different technologies that deliver health care, but we will focus on mobile health for this intervention. Mobile health uses mobile phones to transmit health information [1]. The Community Prevention Task Force found that telehealth interventions can improve medication adherence, clinical outcomes, and dietary outcomes [1].

As previously stated in the target population and need section, the program selected is a mobile health intervention. This intervention uses a personal cellular device to send reminders on exercising, eating healthy foods and providing cardiovascular disease information. For those that are current smokers, there is also smoking cessation information. These reminders will

help participants who already have cardiovascular disease to make healthy lifestyle choices and behavioral changes. There is a multitude of evidence that illustrates mobile health interventions' effectiveness with many diseases, which will be discussed in the next section. This intervention will need to be tailored to Detroit's specific population since it has not been implemented yet in this setting. Mobile health interventions were selected for this intervention since they are considered cost-effective and can reach a vast population.

Evidence-Based Program

For this intervention, we will be using the TEXTME program. The TEXTME program was developed in Australia in 2013, focusing on improving the health outcomes of those diagnosed with cardiovascular disease. The original intervention was a randomized control trial that included 720 participants, with half of those participants receiving the intervention. Those that received the intervention received four messages per week for 24 weeks with randomized times that these messages were sent [3]. There was also a dedicated bank of text messages to ensure that participants received the adequate and correct information. An example of the messages is included in the appendix section, in Appendix A. [3]. These messages were all evaluated in a separate study and modified based on feedback from experts and participants. Messages included motivational words to promote healthy eating and exercise, facts about cardiovascular disease, and reminders to exercise and take medications. For those that were smokers, messages included information to encourage smoking cessation as well. After six months, participants were evaluated. The study's goal was to increase physical activity, decrease smoking, and reduce cholesterol and blood pressure.

Results from the original TEXTME intervention illustrated that cholesterol levels were lower among those that were in the intervention group. The same outcome was evident with BMI as well. In addition, there were significant increases in physical activity and reductions in smoking. Of those in the study, 91% said the text messages were useful, 97% said that the messages were easy to understand, and 86% said the frequency was appropriate [2].

This study in Detroit will differ from other study interventions since recruitment will be taking place in three different settings, and all of the participants will be receiving the intervention. In the original study in Australia, participants were only recruited from one hospital, and only half of the participants received the intervention; participants who agree to the program will be enrolled in the program and receive text message reminders and encouragements that directly correlate to lifestyle changes to help manage their cardiovascular disease. The text message frequency and the amount of time receiving the intervention will stay the same for Detroit's program.

Adaptations

Several adaptations will be completed for this intervention. The first being that this intervention during the three-year timeline will occur at three settings in Detroit. All three of these settings are clinics where patients are already receiving care for cardiovascular disease. The second change will be that the messages previously included in the study will be altered to include information relevant to Detroit's residents. This is important to help participants become familiar with the resources available to them in the community and tailor the information to feel relevant to the population receiving the messages. Additionally, this

adaptation of the TEXTME intervention will be using medical guidance recommended for individuals in the United States.

The measure of self-efficacy will be added as well for evaluation. The TEXTME program only utilizes biological measures, which may not illustrate the best or most accurate outcomes for the program in a six-month period. By adding the measure of self-efficacy, researchers can determine if there is a change in the six-month period about attitudes towards diet and exercise.

Recruitment and Retention

For the Detroit intervention of the TEXTME program, the three settings participants will be recruited from are all hospitals and clinics. Since this population is already in the care of a medical team or doctor, researchers will be able to obtain medical information for the patients and can refer patients to speak with their health provider if there any questions that the research team is not able to answer. It will be necessary for an interventionist to meet with a hospital team to explain the study and the best approaches to recruiting patients.

The first setting will be the Henry Ford Heart and Vascular Institute in Metro Detroit, Michigan. This setting is being used since patients visiting the hospital will already have a history of cardiovascular disease. The hospital will refer patients to the program that they believe needs extra support with counseling or who have had issues in the past with modifying their lifestyle. The Henry Ford Heart and Vascular Institute was selected as a site since the clinic's larger health system is dedicated to helping the community make healthier choices. From 2016-2018, the main campus hospital implemented the cooking matters program and

generation with promise to increase fruit and vegetable intake. Both of these interventions showed an increase in fruit and vegetable intake by 50% of participants.

The second setting will be the Detroit Medical Center Heart and Vascular Clinic within the DMC Heart Hospital. Since this clinic is a part of a different health system in Detroit, the goal is to recruit different individuals from this area. The Detroit Medical Center also offers benefits for low-income individuals.

The third setting will be the Detroit Community Health Connection, a non-profit primary care organization that provides accessible care. At DCHC, patients who visit the clinic who have been diagnosed with cardiovascular disease will be referred to the intervention. The intervention can be combined in part with the counseling services that are already available at the clinic. Since the clinic serves patients who may not afford other types of care, we will be working with a different population at this site. The Detroit Community Health Connection implementation will help include individuals who may be of low socioeconomic status and may not receive routine medical care.

Eligibility criteria for this study include that participants must have been diagnosed with cardiovascular disease and are currently being treated by a medical professional for this issue. For this program, we will be focusing on cardiovascular disease that has the potential to be treated. This criterion should already be met before someone is recommended to participate in the intervention since health providers will recommend them. Additionally, participants must have a smartphone. More than 75% of the population has and uses a smartphone, so this should not affect eligibility on a large scale [11]. Additional contact information for the participant will be collected when they meet with an interventionist. Participants will be trained

on how to interact and use the text message system during the initial meeting with the interventionist, so only a minimum understanding is needed. Participants will also need to be in the Detroit area and meet with researchers twice during the six months.

The software system (a two-way SMS gateway system) can monitor if messages are not being delivered to participants. After three messages are not received by the participant, the research team will try to reach out to the participant by the other contact methods that were collected in case a participant has changed phone numbers. If researchers are unable to contact the participant after several attempts, they will be removed from the study.

Intervention

To ensure that the program is implemented effectively, the first months of the grant period will be utilized to prepare for the intervention implementation. During this piloting period, tasks include testing the software system, training research staff, and meeting with clinic staff.

Since the software system has already been implemented and used in other studies, the only changes needed will be to update messages used in this study. Additionally, staff will send practice messages on the SMS system to make sure that the software is working efficiently and the staff is comfortable using it.

During month one, the research team will meet with staff at each of the clinics. During this meeting, the research team will walk through the intervention and participant eligibility so that staff at the clinic can recommend patients to the study. The clinics will also be provided with handouts with information about the intervention they can give to their patients.

During the first month, all research staff will complete CITI training before they begin working with participants. Research staff will be required to complete training in the areas they will be working with. Those working with data will be required to complete training on data entry and analysis. Those working to interview participants will be required to complete communication and sensitivity training.

Additionally, the program director will be working to develop the community advisory group during this period. More information about the community advisory group is detailed later in the community support section.

Challenges and Solutions

One of the immense challenges in implementing this intervention in a city that has many disparities that exist between social factors and access to resources. One of the intervention goals is to include information about community resources that are available and free for individuals in the intervention. Adding available resources will allow for a sense of community in this intervention.

Additionally, we will be relying on healthcare providers to recommend this intervention to their patients. This may come as a challenge since research staff will not be the ones recruiting. The research team will have meetings throughout the three-year grant with the clinic staff to make sure that they are updated on the intervention progress.

Community Support

To ensure that the Detroit community's needs are met during this intervention, a community advisory group will be developed. This group will comprise a selection of community members that will make sure participants are receiving correct guidance and

support. Members of the Community Advisory group include a cardiologist from the Henry Ford Institute, the American Heart Association chapter director, and a member of the local YMCA chapter. The community advisory group list is included below, along with information about why each member is included.

Table 1. Community Advisory Group		
Job/ Position Title	Company/ Group	CAG Role
Health Strategies Coordinator	American Heart Association – Detroit Chapter	Provide insight on the importance of heart health, check to make sure materials are correct.
Board Member	YMCA of Detroit	Provide insight on physical activity, help identify resources available in the community
Director of Community Health and Research	Detroit Health Department	Will know the community that the intervention is serving and can provide details of the intervention.
City Council President	Detroit City Council	To provide insight into other issues and projects occurring in Detroit and help spread awareness of the intervention.
Project Member	Detroit Environmental Partnerships	Can provide information on resources available in the community
Professor	Wayne State University – Department of Public Health	To provide insight from a public health standpoint, make sure the intervention is rolled out effectively.
Cardiologist	Henry Ford Health System	The largest health system in the area, making sure the intervention does not overlap with any of the interventions currently in place for heart health, can keep the research group up to date on any new initiatives, can provide guidance for cardiovascular disease patients.
Assistant Director	City of Detroit Office of Sustainability	Can provide information on sustainability practices currently in the city and make sure the project's sustainability plan will work.
Councilmember	The Greater Detroit Area Health Council	Can provide information on activities that are occurring in the city that may be beneficial for the intervention to include.
Member of the Cardiovascular Health, Nutrition and Physical Activity Section	Michigan Department of Health and Human Services	Can provide insight on issues that are happening in the state, other interventions that have occurred, and make sure the intervention is working as planned

Sustainability

The intention of utilizing a mobile health intervention is that it is a low-cost intervention that requires minimal staff oversight. As the federally funded program comes to an end, the intention for this program is to have an automated system set up so that there is no further need for a staff member to send communications to the participants. During the first months of the intervention, the text messages will be reviewed and modified to meet the correct guidance for the United States. Since most of the work associated with the intervention will be completed during the first year, it will require minimal work to keep the program running beyond the three years. Additionally, the goal is to have advertisements for the program in clinic and hospital settings and for participants to sign up via a QR code on the flyer. This trial process will begin in the third year to ensure that any issues that can arise can be addressed. This will eliminate the need for many of the staff initially working on the project and keep the project running without a large budget.

Additionally, with the low cost of the intervention, it is also possible that the hospitals and clinics that are referring patients for the intervention may also adopt this program for use among their patients as a mechanism for helping to manage their cardiovascular disease.

Performance Measures and Evaluations

Performance

For assessment of this project, questionnaires will be utilized from prior implementations of this study. These questionnaires have already been proven to be both reliable and valid. The Diet-SE scale has a measured reliability of $\alpha=.8$, while the EXSE scale has a

measured reliability of $\alpha=.88$. The list of the scales that will be utilized for this study is below, along with information pertaining to what the scales are measuring. Additionally, biological measures will also be taken for this intervention, and they are included in the table as well:

Table 2. Behavioral Measures	
SF-12 Health Survey	Measuring Quality of Life
Diet Self-Efficacy (Diet-SE)	Measuring self-efficacy towards diet and nutrition
Exercise Self-Efficacy (EXSE)	Measuring self-efficacy towards exercise
Self-Report	Measuring fruit/ vegetable intake
Global Physical Activity Questionnaire	Measuring the amount of physical activity
Biological Measures	
Body Mass Index (BMI)	Determining whether individuals are overweight, obese, underweight, or at an average weight and determine if this changes during the intervention
Blood Pressure	Measured to determine if blood pressure is normal or abnormal in patients, also used to determine if there is a change in blood pressure after the intervention.
Cholesterol	Measure to determine if cholesterol is normal or abnormal in patients used to determine if there is a change in cholesterol during the intervention.

These questionnaires and scales aim to determine if participants in the study experience a behavior change towards diet and exercise since these are both constructs that a behavioral change can modify. For this intervention, we will be focusing on self-efficacy using guidance from the Information-Motivation-Behavioral Skills Model. This intervention will be sending relevant health information to participants to increase their knowledge about physical activity, nutrition, smoking, and cardiovascular disease. Examples of some of these messages are included in the next section. Additionally, messages will be sent to participants to encourage smoking cessation, increase physical activity, and to eat healthier. From participants gaining

information and motivation, the intention is that they will gain behavioral skills/ increase their self-efficacy towards physical activity and eating healthy. The intended goal is that this increase in self-efficacy will lead to behavior change.

Those who want to participate in the study will be required to meet with an interventionist to record their data and set up the required application on their smartphone. During this meeting, the interventionists will have the participants fill out the questionnaire that is required. The information collected will include the participant's demographics, medical history pertaining to their heart health, and information about their current beliefs towards their health and education about cardiovascular disease. Additionally, contact information will be collected along with alternative methods of contact in case a participant is unable to be contacted by their original phone number.

Participants will fill out the questionnaires upon recruitment into the study; this will be completed while meeting with the interventionist. These same questionnaires will be completed after the six-month period that they are enrolled in the study.

Process

Several measures will be conducted both before and after the intervention to adequately determine the intervention's effects. This includes biological measures such as blood pressure, weight, and cholesterol levels. Behavioral measures such as physical activity and diet will also be measured, and psychological measures such as self-efficacy towards lifestyle and health. Biological measures will be taken before the intervention and after the intervention for comparison; the goal is to see changes with these biological measures after the six-month period; however, it may take longer for these effects to be apparent that is why

behavioral measures will be taken as well. Behavioral and psychological measures will be taken before and after the intervention, and some information will be collected from participants using the texting system.

To ensure that the participants receive and participate in the intervention, some messages sent to participants will ask for a response. Such as "Exercising is a great way to stay in shape, did you exercise today?". This will allow researchers to determine which participants were engaged in the study and to determine if there were any discrepancies between those that responded versus those that did not respond. Additionally, the software that will be utilized to send the text messages can tell researchers which messages were not delivered or opened.

Table 3. Example Messages for Detroit TEXTME Program	
Physical Activity	Walking is a great way to start exercising; try taking a brisk walk today.
Diet	It is recommended to eat two servings of fruits a day; try to add fruit to your dinner plate tonight.
Smoking	For help with smoking cessation, check out smokefree.gov , a website that provides tips for quitting smoking.
Cardiovascular Health	If your doctor has prescribed you medications for blood pressure and cholesterol, make sure you take them every day.

By monitoring the responses to messages that require a response, the researchers will determine if there are any questions or messages that are not appropriate or are not working. This will be a part of the continued quality improvement that will occur throughout the study. A member of the Data, Planning and Evaluation team from the Detroit Health Department will pull this data on a bi-weekly schedule to review. This will continue throughout the program to understand what is working for participants and what can be improved.

Additionally, at the six-month follow-up, participants will be administered an additional questionnaire that will ask participants what messages they remembered, which ones they liked or disliked, and whether they decided to keep the messages to help to determine the acceptability and feasibility of the intervention.

Medical records will be pulled for each of the participants after they complete the six-month intervention. This will allow researchers to determine if there are biological changes that occur after the participants have been in the program for six months.

Outcome

Below is a list of the intervention's objectives and the data source that will be used to measure the objectives.

Objective	Data Source
Assess whether the Textme intervention was delivered as planned	Software data, questionnaires
Reach of the program	Software logs
Examine factors that influenced engagement	Text message responses, questionnaires
Delivery of program -timing, frequency, content, duration	Surveys, questionnaire

To determine if the intervention has changed participants' behavior, the results from a post-test will be compared to the answers of a pre-test. This will measure whether or not there was a lifestyle change in terms of diet, biometric changes, or changes with physical activity.

Additionally, interaction with the messages will also be analyzed to determine how often participants interacted with the messages. Finally, participants will be questioned during their second meeting with an interventionist to learn about how much they interacted with the

messages to help determine if the messages were the reason that changes occurred among the participants.

The program's potential risks include that the participants may move away and be no longer considered for the project. Additionally, participants may not have enough time to attend the program if they change their work or take additional responsibilities. As well there may be fluctuations with different times in the year. For example, participants may be reluctant to participate during the holiday season since they may be busy and may not have time to add exercise or healthy eating to their schedule.

There are several barriers that we have identified in this study. One of the most significant being that participants must have a smartphone to participate in this study. This can potentially keep some people from the study that might benefit from it. Additionally, participants are required to meet with an interventionist before beginning the study to fill out a questionnaire and have their phone set up for the intervention, as well as meet with an interventionist at the end of the study to complete the post-questionnaires as well.

Capacity and Experience of the Applicant Organization

The applicant organization, the Detroit Health Department, has tremendous reach and knowledge of the community. In August 2017, the Detroit Health Department (DHD) began conducting a large-scale community needs assessment that included door-to-door interactions with two thousand Detroit residents to determine what changes should be made to make the city of Detroit a healthy place to live.

The DHD is committed to improving the health of the city of Detroit through the initiative of special projects. The special projects team develops new programs that align with the goals and priorities of the DHD. These projects are both reviewed and approved by the health director. The team works to locate funding opportunities for these projects, usually working alongside the Office of Grants Management and the City's Chief Development Officer.

The Detroit Health Department includes a Data, Planning, and Evaluation team that collects and analyzes health data from the city. The team has experience and expertise in epidemiology, environmental health, policy analysis, program evaluation, and city and regional planning. The Data, Planning, and Evaluation team utilizes the Mobilizing for Action through Planning and Partnership framework (MAPP) to understand the community's needs and determine when changes need to be made.

The mobile cardiovascular intervention will be jointly developed and accessed by the special projects team and the division of chronic diseases and injury prevention. This joint approach will be developed to ensure that funding is utilized adequately, correct procedures are followed, and that the program is aligned with the goals of DHD. Additionally, the Data, Planning, and Evaluation team will help collect data from the project and document the process.

The Detroit Health Department has conducted successful interventions in the past. This includes the Lead Safe Detroit program. The number of children who have had elevated lead levels has decreased by half since 2009, but the Detroit Health Department still viewed lead as an issue. In 2016, the Detroit Health Department developed a coalition between community partners and city departments to coordinate childhood lead prevention and removal in Detroit.

The Lead-Safe Detroit Coalition provides education, school, and home water testing, removes lead sources in homes, and works to strengthen the environmental standards for lead.

The Detroit Health Department's mission is to foster collaborative efforts that protect and promote public health, equity, safety, and well-being. The vision of the Detroit Health Department is for healthy communities where everyone has the opportunity to thrive. The goal of the mobile cardiovascular intervention is to improve the health outcomes of those recently diagnosed with cardiovascular disease to increase the health of the population of Detroit.

The applicant organization, the Detroit Health Department, will work diligently to adapt and implement the mobile cardiovascular intervention. It is important to note that the city of Detroit and the Detroit Health Department prohibits discrimination on the basis of age, disability, sex, race, color, national origin, religion, sexual orientation, or gender identity. Any person who believes that they have been a subject of discrimination because of their class can file a complaint with the City of Detroit's Human Rights Department.

Partnerships and Collaborations

To effectively implement the Textme intervention into the Detroit community, stakeholders, collaborators, and partners will help. One of the leading partners we will be working with is the Henry Ford Medical System within the Detroit area. It is one of the largest medical groups in the area and will be the primary campus for this intervention. The Henry Ford Health System is committed to improving the health of those in Michigan and has a history of improving health in the community by implementing interventions. Additionally, the Henry Ford Health System also completes a Community Health Needs Assessment every three years.

In 2016, the Henry Ford Main Campus employed the Generation With Promise Program to increase the consumption of fruits of vegetables among participants; the goal was to have 45% of participants report an increase in fruit and vegetable consumption by .28 times per day. The outcome was that 51% of participants increased their fruit and vegetable intake. A similar program that was implemented at the same time was Cooking Matters that had a similar outcome. Just as the intervention's goal is to improve individuals' health, the Henry Ford Health System's mission is to improve lives through science, healthcare, and healing.

Additionally, we will be working closely with the Detroit Community Health Connection, a non-profit clinic in the area that provides services for low-income individuals. It will be the location of one of our other settings. We will also be working with the Detroit Medical Center with the Heart and Vascular clinic. These two sites do not have as much experience implementing interventions, but we will be working with other community stakeholders and programs.

Several non-profits will help with the TEXTME intervention, including the American Heart Association, YMCA, and Eastern Market. The American Heart Association is a national organization that has a division in the Detroit Area. The American Heart Association has completed other programs in the past that are focused on improving physical activity and nutrition. This includes the Heart 360 Get to Goal to have blood pressure screenings available to vulnerable populations. The American Heart Association will review the material sent out to participants to ensure the information is correct. The YMCA will review some physical activity information to ensure that it is accurate in the same capacity.

Additionally, we will be working with the Eastern Market. A community marketplace that also provides cooking classes to the community. We will advise this group to provide information on healthy cooking and eating. These groups will be consulted during the beginning of the intervention (in the first few months) to ensure that all materials are appropriate.

We will also be relying on other members of the community. This includes working with groups at Wayne State University, including the college of public health. We will be working with members of the Detroit Healthy Environments Partnerships as well. These partnerships will exist starting in the first year of the intervention and will continue throughout the three years.

We will be working closely with the Community Advisory Group members and working closely with members from each of the intervention sites. This will ensure that the intervention is implemented in the best way and causes no harm to the community.

Project Management

Members of the Detroit Health Department will staff this program. These staff members will implement, manage, and control the program. This project team will consist of a program director, primary investigator, graduate student staff member, research specialist, data specialist, and program specialist.

The primary investigator will ensure that the program is implemented correctly and on time. This schedule is outlined on the Gantt chart (Appendix C). The primary investigator and the program director will work closely together to ensure that all parts of the program are implemented correctly. The primary investigator will be the division director of the Chronic Disease and Injury Prevention Branch of the Detroit Health Department. The program director

will be in charge of the budget, staffing, and progress of the implementation. This person will be a member of the Chronic Disease and Injury Prevention Branch. The program director will also ensure that all partners are kept up to date on the progress of the implementation and work with the data specialist to evaluate the program. They will also work to make a schedule for the staff and can help with interviews if needed.

The data specialist will be in charge of pulling information from the SMS gateway system on a bi-weekly basis and send this over to the research specialist to create a report. The data specialist will also monitor the software system daily to make sure that it is running correctly. Additionally, they will be involved in the data analysis process. The project specialist will keep track of the program's implementation and look at each setting's records. They will also work to pull the medical records for the participants. The graduate research assistant will complete monthly progress reports and work closely with the data specialist to make these reports. They will also help with interviewing participants in the study. Finally, the research specialist will set up the intervention times and check to make sure that participants are engaged.

The core project team will be meeting every week to track the progress of the intervention. This will allow the team to discuss any issues that arise, plan the intervention's next steps, and keep the team updated on the intervention's progress. This will also allow the team to make sure they are meeting all outlined objectives.

The program director will attend a national conference in Washington D.C. required for all grant members to attend. During the second and third year, the two team members will be traveling to Chicago to attend a regional conference. Additionally, all staff members will be completing the required IRB training and other required training by the Detroit Health

Department. The Detroit Health Department has a low staff turnover rate and many benefits available to keep staff on the project.

A. Personnel:

Personnel	Effort	Salary		Fringe	Total
Principal Investigator	15.00%	\$100,000	\$15,000	\$4,115	\$19,115
	25.00%	\$103,000	\$25,750	\$7,063	\$32,813
	25.00%	\$106,090	\$26,523	\$7,275	\$33,798
Project Director	75.00%	\$55,000	\$41,250	\$13,401	\$54,651
	75.00%	\$56,650	\$42,488	\$13,803	\$56,290
	80.00%	\$58,350	\$46,680	\$15,165	\$61,844
MPH GRA (up to 50%)	50.00%	\$32,000	\$16,000	\$6,490	\$22,490
	50.00%	\$32,960	\$16,480	\$6,685	\$23,165
	50.00%	\$33,949	\$16,974	\$6,885	\$23,860
Data Specialist	25.00%	\$50,000	\$12,500	\$4,201	\$16,701
	25.00%	\$51,500	\$12,875	\$4,327	\$17,202
	30.00%	\$53,045	\$15,914	\$5,349	\$21,262
Research Specialist	60.00%	\$45,000	\$27,000	\$9,446	\$36,446
	60.00%	\$46,350	\$27,810	\$9,729	\$37,539
	60.00%	\$47,741	\$28,644	\$10,021	\$38,665
Project Specialist	40.00%	\$45,000	\$18,000	\$6,297	\$24,297
	35.00%	\$46,350	\$16,223	\$5,675	\$21,898
	30.00%	\$47,741	\$14,322	\$5,010	\$19,333

Program Director:

The program director will be in charge of the day-to-day activities involved with the intervention. This person has experience working with members in the community with chronic diseases and has managerial experience. This person will work primarily with the budgeting, staffing, and overall implementation of the program. This person will primarily be working with this intervention during the three years. The annual salary of this position will be 50,000 dollars along with fringe benefits.

Primary Investigator:

The primary investigator will oversee the implementation of the TEXTme program in Detroit. They will work with the community advisory group and the program partners. This person will

be the division director of the Chronic Disease branch of the Detroit Health Department. They will be working closely with the program director to make sure that the program is implemented correctly.

Data Specialist:

The data specialist will be working to pull data from the SMS gateway and will complete data analysis for the program. This includes looking at the collective data from the entire program. The research specialist will conduct smaller parts of the data analysis. The data specialist will pull reports bi-weekly but will be checking daily to make sure that the software is working correctly.

Project Specialist:

The project specialist will be in charge of implementing the intervention in the three settings and will check in with these three locations every month. Since this person works in the special projects section of the Detroit Health Department, they will have adequate experience working with the community and understanding the community's needs. They will also pull medical records for the participants in the study.

Research Specialist:

The research specialist will work with the project director to interview participants; they will also check the participants' logs to ensure they are engaged. They will also monitor participants' progress to determine if there are any common points where participants seem to be quitting the program or if there are any messages that are not being responded to.

Graduate Research Assistant:

The graduate research assistant will interview participants with the research specialist; they will also help make the biweekly reports to see how many participants are enrolled in the study and how they participate.

B. Supplies

The supplies for this intervention will include iPads. The iPads will be used by the participant staff when they are interviewing participants for the survey. This will allow participants to mark their answers to the questions.

Item Requested	Number Needed	Unit Cost	Amount Requested
iPad	3	\$350	\$1050

C. Travel

The program director will be attending a national conference in Washington, D.C., during each year of the program. This will allow the program director to connect with other research directors. In addition, during the second and third year, two team members will be attending the regional conference in Chicago, Illinois. This will be an opportunity for professional development and a time to learn about other research projects. Additionally, some staff will be required to visit both the partners and the sites that are being recruited.

	Expense	Year 1	Year 2	Year 3
Program Director Meeting in Washington, D.C.	Airfare	\$200	\$200	\$200
	Lodging (3 days)	\$400	\$400	\$400
	Per Diem	\$190	\$190	\$190
	Number of Attendees	1	1	1
	Total	\$790	\$790	\$790
Annual Regional Meeting in Chicago	Airfare	N/A	\$200	\$200
	Lodging (3 days)	N/A	\$400	\$400
	Per Diem	N/A	\$190	\$190
	Number of Attendees	N/A	2	2
	Total	N/A	\$1580	\$1580
Research Travel	Traveling to Recruitment Sites	\$500	\$500	\$500

D. Other Expenses

For this program, the Detroit Health Department will be utilizing the Textme software developed by a group in Australia. The estimated cost for this program is outlined below. In addition, we will be utilizing a two-way SMS gateway so that participants can directly respond to messages.

SMS Two Way Gateway	\$1600	\$1000	\$1000
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E. Cost of Program for Detroit Health Department

Below the budget is outlined based on personnel, supplies, software, and travel expected over the three years.

Category	Year 1	Year 2	Year 3
A. Personnel	\$173,700	\$188,907	\$198,762
B. Supplies	\$1,050	\$0	\$0
C. Travel	\$1,290	\$2,870	\$2,870
D. Software	\$1,600	\$1,000	\$1,000

Total costs for the three year grant period:

Category	Total Cost
A. Personnel	\$561,369
B. Supplies	\$1050
C. Travel	\$7030
D. Software (SMS Two Way Gateway)	\$3600
Three Year Total	\$573,049

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Appendix A: Examples of text messages used for the intervention group for the TextMe intervention

Box 1 Examples of messages sent to the TEXT ME intervention group

General cardiovascular health and medications

- Check out <http://www.heartfoundation.org.au> for tips and info about preventing heart disease
- Are you taking daily aspirin? If not discuss it with your Dr
- Not having support of family and friends can worsen heart disease—if you need help, don't be afraid to ask
- Remember—cholesterol and blood pressure lowering tablets need to be taken every day

Nutrition

- Healthy eating means at least five serves of vegetables and two serves of fruit every day
- Try bananas for an easy and nutritious sandwich filling
- To add interest to your meals try a new fruit, vegetable or herb
- Try steaming, baking or BBQ to reduce the need for excess oil when cooking

Physical activity

- Keep a calendar of how often you walk
- Begin activity at low intensity and gradually increase
- There are many ways to increase your activity levels. Try Tai Chi, pilates, gardening, yoga or dancing
- The more you eat the more you need to exercise

Smoking

- Its never too late to quit smoking
- It may take several attempts to quit, so keep trying
- If you crave a cigarette try and distract yourself by going for a walk or doing something creative
- Check out the website <http://www.icanquit.com.au> for tips and to track your progress when quitting smoking

Appendix B. Logic Model

Inputs	Activities	Outputs	Short Term Outcomes	Medium-Term Outcomes	Long Term Outcomes
<ul style="list-style-type: none"> -Money for intervention -Development of staffing structure -Materials to provide adequate information about cardiovascular disease -SMS gateway for sending text messages -Equipment for intervention 	<ul style="list-style-type: none"> -Hire staff -Train clinic staff to recruit participants -Create a community advisory group -Recruit participants -Train participants on how to use the program -Create a list of community resources 	<ul style="list-style-type: none"> - Creation of sustainable practices - Community resources sent to participants -Trained staff members 	<ul style="list-style-type: none"> -Better adherence to medications for those in the intervention -Self-efficacy increase for physical activity -Self-efficacy increase for healthy diets -Improved knowledge about cardiovascular disease, physical activity, and nutrition 	<ul style="list-style-type: none"> -Quality of life increases for participants in the intervention -Decrease in hospitalizations for those with cardiovascular disease 	<ul style="list-style-type: none"> -Decreased mortality related to cardiovascular disease -Decreased costs associated with hospital stay related to cardiovascular disease -Decreased number of strokes, heart attacks in patients diagnosed with cardiovascular disease -Life expectancies increase for those diagnosed with cardiovascular disease

