COMMUNITY-BASED DIABETES PREVENTION PROGRAM: AN EXTENSION
OF 100 CITIZENS
A WORKSITE-WELLNESS BASED DIABETES PREVENTION PROGRAM

A thesis submitted in partial fulfillment of the requirements
For the degree of Master of Science in Kinesiology

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COMMUNITY-BASED DIABETES PREVENTION PROGRAM: AN EXTENSION OF 100 CITIZENS

A WORKSITE-WELLNESS BASED DIABETES PREVENTION PROGRAM

By Michael Wong

Master of Science in Kinesiology

The purpose of the present study was to examine whether a free 12 week modified diabetes prevention program delivered by Kinesiology students in a worksite setting can successfully yield a 5-7% weight loss in adults who are pre-diabetic. The program consisting of structured physical activity, health education sessions, and self-dietary tracking included participants ranging from 32 to 64 years of age. The one-group, pre-mid-post-test experimental research study evaluated the participants’ potential for reducing risk of developing Type 2 Diabetes Mellitus (T2DM) by measuring change in initial body weight. The program was implemented by a staff consisting of a Kinesiology graduate lead researcher and 11 Kinesiology undergraduate volunteers from California State University Northridge.

There were 12 participants who initially enrolled in the study but only four participants attended at least 80% of the sessions and only one participant met all of the inclusionary and exclusionary criteria for eligibility. Results showed the one participant
eligible for the study achieved a 7% weight loss of their initial body weight at the end of the 12 week program.

The participants who attended did engage in the minimum recommendations for physical activity recommended by the Centers for Disease Control and Prevention at each session. Student volunteers were also able to gain experience in exercise instruction and learn basic health education topics from the Diabetes Prevention Program curriculum. The modified worksite diabetes prevention program addressed the barriers of cost and accessibility that challenges individuals in the worksite setting.

The modified worksite diabetes prevention program demonstrated a model that could be successful in helping participants prevent the development of T2DM. The minimal use of equipment, Kinesiology student volunteer staff, use of field testing, and location base at the worksite can be replicated at other campus settings.
CHAPTER I

Introduction

Statement of the Problem

Physical inactivity has become a major issue in American public health. A physically inactive lifestyle can lead to various health complications and preventable diseases including Type 2 Diabetes Mellitus (T2DM). The prevalence of diabetes has risen to over 18.8 million people in the United States and 25.8 million people globally with an additional 7.0 million cases undiagnosed (CDC, 2011). Excess body weight, physical inactivity, family history, and lower economic status have all been shown to increase the chances of developing T2DM (ADA, 2013). T2DM can be detrimental to an individual’s life and efforts would be well invested in preventing the disease from occurring.

Purpose of the study

At California State University Northridge (CSUN) the health and wellbeing of the staff and faculty is important. There has been a worksite-wellness program formerly known as the Wellness Program and presently the Commit to be Fit program created to increase the physical activity levels of the CSUN staff and faculty. Although efforts have been made to address physical activity there was no specific program to address preventing T2DM. The purpose of this study was to determine whether a free 12 week modified worksite diabetes prevention program could successfully yield 5%-7% weight loss in the CSUN staff and faculty who are pre-diabetic.
Significance of the Study

Unfortunately, there are barriers such as cost (for both participants and staffing), accessibility (convenience for participants), or staffing (the availability of professionals to deliver a program) when implementing a successful worksite diabetes prevention program attempting to achieve healthy weight loss. There may be multiple reasons for these barriers and solutions are often multilayered and complex. In a university worksite, factors such as Kinesiology student interns, campus physical resources, and common work schedules create an ideal location for implementing a diabetes prevention program.

Brief Overview of Methods

The free worksite based diabetes prevention program was open for all pre-diabetic CSUN staff and faculty. For 12 weeks during the summer of 2013, the program met at the end of the workday at 5:15pm on Mondays, Wednesdays, and Fridays at CSUN’s Fitness Center to engage in structured physical activity and health education that included dietary and physical activity tracking. The structured physical activity included a warm-up, strength training, and cardiovascular exercises at a moderate intensity while the health education component included topics modified from the National Diabetes Prevention Program (NDPP) curriculum such as stress management, strategies to eat healthier and managing behavior changes. Participants were also expected to track all of their dietary intake and physical activity while being recommended to limit their calorie intake based on the NDPP curriculum. At the end of each week, participants were weighed to track changes in weight. A direct way to measure T2DM risk is the glycated hemoglobin test. Unfortunately due to the limitations of appropriate staffing and cost, the glycated hemoglobin tests were not used. In addition the participants’ upper body muscular
endurance, cardiovascular endurance, and lower body flexibility were measured through various types of field tests. The program was planned by Kinesiology graduate researchers and implemented with Kinesiology undergraduate student volunteers.

Assumptions

The following assumptions were made:

- Instruments used in the program were reliable and valid.
- All of the participants would put forth their best effort during the tests.
- Participants would wear comparable clothing when being weighed.
- Participants were honest and accurate with the self-monitoring of dietary intake and physical activity.
- Participants were a reasonable sample that represents pre-diabetic adults in the worksite setting.
- Undergraduate Kinesiology student volunteers were capable of instructing exercises and conducting field tests accurately.

Limitations

- The modification of the NDPP curriculum designed for 16 weeks into 12 weeks affected the amount of time for changes in weight and fitness levels from the structured exercise.
- The unpredictability in the work schedules of the participants of the program. Not all participants were able to make it to the program due to temporary changes in their work schedules that were beyond their control.
- The small sample size given the program consisted of 4 participants who all attended the minimum amount of 26 sessions to be included in the
testing, and only 1 participant met both the minimum attendance and was considered “pre-diabetic” by our guidelines.

**Delimitations**

The delimitation of the program is assessing the risk of T2DM through body weight and the National Diabetes Education Program (NDEP) Risk Test and not blood plasma glucose testing. The reasons were due to the community setting of the workplace, cost of testing, and the qualifications of the Kinesiology students.
Chapter II

Literature Review

Introduction to T2DM

T2DM can be characterized by a disturbance in the equilibrium of glucose in an individual which can include: impaired insulin secretion, insulin resistance, and irregular visceral glucose uptake (DeFronzo, 2004). Insulin is secreted by the pancreas to facilitate the transport of glucose to cells. Individuals with T2DM become resistant to insulin which means the body will have a lower sensitivity to insulin and the biological response to its release would be abnormal (Wilmore, Costill, & Kenney, 2008). It is important to note high blood levels of insulin known as hyperinsulinemia is associated with T2DM because there is a diminished response to insulin.

T2DM is defined by the American Diabetes Association (ADA) as meeting one of the following criteria:

- Glycated hemoglobin (A1c) value of 6.5% or greater
- Fasting plasma glucose ≥ 126 mg·dL⁻¹ (7.0 mmol·L⁻¹)
- A 2-h plasma glucose level ≥ 200 mg·dL⁻¹ (11.1 mmol·L⁻¹) during an oral glucose tolerance test using 75g of glucose
- Symptoms of hyperglycemia such as polyuria, polydipsia, and unexplained weight loss ("Exercise and Type 2 Diabetes: American College of Sports Medicine and the American Diabetes Association: Joint Position Statement," 2010).

Individuals who are diagnosed with diabetes increase their risk for: coronary heart disease, cerebrovascular disease and stroke, hypertension, peripheral vascular disease,
kidney disease, eye disorders including blindness, and toxemia during pregnancy (Wilmore et al., 2008)

**Increased Prevalence of Type 2 Diabetes**

T2DM has become more common with the rise in BMI and is most prevalent in those who are obese (NIH, 2012). It is estimated that 26 million Americans are affected in some way by diabetes and as many as 79 million individuals in the U.S. are pre-diabetic (Albright & Gregg, 2013).

It is important to acknowledge the economic problems related to a rise in diabetes. In 2007, the total estimated cost of diagnosed diabetes was $174 billion and it was estimated that $116 billion was due to medical costs and $58 billion was due to absenteeism, reduced work productivity, unemployment, and premature mortality ("Economic costs of diabetes in the U.S. In 2007," 2008). In 2012, the total estimated cost for diabetes had risen to $245 billion and the total cost accounts for over 20% of U.S. healthcare spending (American Diabetes, 2013). Current trends show that if the obesity rates continue at this pace, 6 million more cases of T2DM will emerge in the next 20 years (Levi, Segal, St. Laurent, Lang, & Rayburn, 2012). As obesity rates rise, the heavy economic cost associated with it will also rise.

In order to lower the costs, a greater effort needs to be made in preventing diabetes. Research has shown that lowering BMI lowers the health related risk factors for individuals and in fact, the most effective means to lower the risk of diabetes should be focused on weight reduction (Hamman et al., 2006). A simple and safe way to lower BMI is utilizing exercise and a proper diet to reduce 5% of total body weight. It is estimated that a statewide reduction of the average BMI by 5% by 2030, could save up to 7.9% in
health care costs. In California this translates to an estimated savings of $81.7 billion (Levi et al., 2012) and there would be an estimated 796,430 fewer cases of T2DM diagnosed in California (Levi et al., 2012).

Physical Activity and T2DM

The physical activity recommendation for adults is to participate in 150 minutes of moderate intensity activity per week along with two muscle strengthening activities on two or more days which include all the major muscle groups (Centers for Disease Control and Prevention, 2011). It is important for adults to participate in physical activity because of the health benefits such as increased bone and muscle health, greater success in weight control, increased lifespan, and a decreased rate in falls (CDC, 2011). Regardless of race or sex, physical activity can be used to maintain or improve an individual’s current level of fitness. An improved fitness level allows an individual to complete daily activities such as stair climbing, cleaning and gardening at a lower relative intensity. Exercise or physical activity in general will yield many health related benefits (National Institutes of Health, 2011).

The Centers for Disease Control and Prevention (CDC) found that 30 minutes a day of moderate intensity exercise was effective in preventing T2DM for all populations (Gang, Lakka, Kilpeläinen, & Tuomilehto, 2007). By utilizing a moderate intensity, it ensures that the exercise is still strenuous enough to cause change yet minimize the risks of injury. Endurance and strength training exercises should both be performed. Endurance exercises can include brisk walking, jogging, swimming, or aerobic ball games. Strength training exercises need to be functional and include large muscle groups in the upper and lower body. Examples of this would be squats, modified push-ups,
lunges, and upright rows. Finally, the volume of each exercise should be moderate to high which can range from 8-20 reps and include up to 4 sets (Gang et al., 2007).

Unfortunately many individuals do not participate in the CDC recommendations for physical activity and do not gain any of the health benefits associated with physical activity. According to the World Health Organization (WHO) 31% of adults aged 15 years or older did not participate in sufficient physical activity (WHO, 2013) and the CDC estimates that physical inactivity ranged as high as 43.0% for some counties in the United States (CDC, 2011). Related to physical inactivity is the rise of obesity rates in America. The National Center for Health Statistics reported that 35.7% of adults in 2009-2010 were obese which constitutes nearly 41 million woman and 37 million men over the age of 19 (Ogden, Carroll, Kit, & Flegal, 2012). Those who suffer from diabetes have equally high rates of physical inactivity; 39% of adults with diabetes were found to be physically sedentary (Morrato, Hill, Wyatt, Ghushchyan, & Sullivan, 2007).

There are multiple options for treating individuals with T2DM such as modifying dietary intake, monitoring blood glucose levels, taking diabetes medication such as Metformin, and participation in regular physical activity. In addition to treatment options, it is important to recognize that T2DM is a preventable and reversible disease (Pan et al., 1997). While prevention is important for all individuals, prevention is most essential in those who are considered at risk for T2DM. Risk factors for T2DM include sex, family history, race, blood pressure, age, activity level, and body mass index (BMI) (Marrero & Parchman, 2012).
Barriers to Diabetes Prevention

A barrier associated with the NDPP is cost. Programs can be expensive due to direct and indirect medical costs. In the first year of the NDPP lifestyle intervention, NDPP group lifestyle intervention and Metformin intervention were compared to a control the costs were $1826, $898 and $584 respectively per participant. Fortunately the costs were lower in the following years and by the third year the cost for the, NDPP group lifestyle intervention, Metformin intervention, and control were $915, $299, and $591 respectively ("The 10-year cost-effectiveness of lifestyle intervention or metformin for diabetes prevention: an intent-to-treat analysis of the DPP/DPPOS," 2012). Still, despite lower costs not everyone is able to afford the interventions for diabetes prevention care. The 10-year cost effectiveness of the NDPP concluded less than 20% of new interventions in health and medicine were cost saving (2012). Cost considerations need to be a priority for future programs because they will only be available to limited populations if the cost per participant is too high.

Another barrier to diabetes prevention programs is accessibility. Health care settings can be ideal for offering behavioral interventions and meeting places for programs such as the NDPP due to their expertise and resources (Ackermann, Finch, Brizendine, Zhou, & Marrero, 2008). However, not all communities have local health care settings. Environments with cycle ways, footpaths, health clubs, and swimming pools are associated with greater amounts of physical activity. At the same time the home environments which had exercise equipment or exercise videos also had higher levels of physical activity (Humpel, Owen, & Leslie, 2002) but not all communities can afford exercise equipment, exercise videos, or have outdoor facility access. The other factor in
the environment was the issue of perceived safety. Environments with high levels of physical disorder such as: loitering homeless people, bars on windows of buildings, unkempt or dilapidated buildings, security barriers around residential and retail property, teens showing negative behavior, and vandalism had lower participation rates of physical activity. Areas of low perceived safety had a negative association with physical activity and the negative association with physical activity was found to be greater in females (Slater et al., 2010). Attention to the built environment is critical to increase physical activity.

Individuals who live in rural or urban environments face the barrier of not having an environment with easy accessibility or even affordable accessibility. Since they may likely have an environment that is not conducive to outdoor accessibility, the individuals need to look for other means to increase their physical activity. An effective way to increase physical activity for this population would be to have physicians plan physical activity and follow-up on their progress (Deshpande, Baker, Lovegreen, & Brownson, 2005). The use of physicians was found to have a high associated with regular physical activity among individuals with diabetes (Deshpande et al., 2005). Physical impairment itself limits physical activity, it was found in the same study that 47.6% of individuals who participated in no physical activity had a physical impairment (Deshpande et al., 2005). In order to increase physical activity for everyone, health experts need to hire qualified professionals who have the capacity to instruct appropriate exercise but also have the ability to make modifications in exercises for the physically impaired.
Modified Diabetes Prevention Programs

There have been various different programs targeted towards addressing the barriers to diabetes prevention programs. Ideally the program needs to be led by an exercise specialist who understands human movement. The exercise specialist can form modifications and progressions for the participants who are obese or have any special needs. The exercise specialist also needs to have an understanding of appropriate exercises for populations that are conducive to not only weight loss but to improving overall fitness. Components of fitness include cardiorespiratory endurance, muscular strength, muscular endurance, flexibility, and body composition. Kinesiology is a college major that provides students with the education required to teach exercises safely with modifications and progression.

The program also needs to be centered towards weight loss because weight loss has been shown to be the most effective factor in reducing the risk for T2DM (Pan et al., 1997). In order for weight loss to be achievable, there needs to be a nutrition component to supplement the exercise. By having a nutrition component the issue of limiting calorie intake is addressed. Finally a sound program must also include an education component to encourage healthy lifestyle changes. The education component would be a resource for the individuals to learn about what diabetes is and ways to stay motivated with the exercise and nutrition (Kramer et al., 2009).

Perhaps one of the most well-known and successful programs is the Diabetes Prevention Program (NDPP). The NDPP was a 16 week program that focused on achieving a minimum of 7% weight loss for the participants through various different strategies. The strategies for weight loss included: lifestyle coaches, communications
with the participants, a health education curriculum, structured physical activity sessions, group and individual options for intervention, a resource kit that is specific to the individual, culturally relevant strategies, and a network dedicated to providing training, feedback, and clinical advisement ("The Diabetes Prevention Program (DPP): description of lifestyle intervention," 2002). The basic idea was to provide the participants with 16 weeks of goal-based behavioral intervention which included encouraging participants to engage in 150 minutes of moderate intensity exercise each week. The intervention emphasized brisk walking or similar related activities which include aerobic dance, bicycle riding, skating, or swimming ("The Diabetes Prevention Program (DPP): description of lifestyle intervention," 2002). In addition, the participants would be taught the NDPP curriculum so they could develop healthy lifestyle habits and sustain their progress after the study. The participants were also asked to limit their caloric intake, and log their diet and physical activity. All of these strategies were focused towards an effort to lose a minimum of 7% of their total body weight. The program has been administered to over 1,000 participants and nearly half of the participants were racial and ethnic minorities. The program was able to reduce the incidence of diabetes by 58% ("The Diabetes Prevention Program (DPP): description of lifestyle intervention," 2002).

In efforts to continue the success of the program there have been various translations of the program through different means. One version translated the NDPP into being delivered by YMCA facilities (DEPLOY). The DEPLOY program compared an experimental group and a control group. The experimental group followed the same exercise, nutrition, counseling, and education curriculum as the original NDPP. Participants of the control group were given similar testing, brief counseling, National
Diabetes Education Program materials, and minimum access to the YMCA facilities. At the YMCA facilities, NDPP researchers trained YMCA employees who were registered dieticians or had a master’s degree in the related health field. The trained YMCA staff delivered the same NDPP program to the experimental group. The result was the experimental group saw a 6% weight loss upon completion of the DEPLOY program and participants were able to maintain this weight loss at the 14 month follow up (Ackermann et al., 2008). This study showed that the YMCA was a feasible route to deliver the NDPP effectively and still maintain the success of weight loss.

In addition to the DEPLOY study, there has also been a worksite translation of the NDPP named FUEL Your Life (FYL). The goal of FYL was to create a simple weight management intervention that would be versatile enough to implement in multiple types of work environments (Dejoy, Padilla, Wilson, Vandenberg, & Davis, 2012). The NDPP curriculum was slightly reformatted to be easier to understand for self-study. The lessons included questions to be completed by the participants at the end of each section. The biggest difference of the FYL program from other modified diabetes prevention programs was the limited interactions participants had with the researchers. They met during the initial session to set goals and brief instructions. Afterwards the researchers trained a select few participants to become peer health coaches (PHC). The PHC would assist the other participants in learning the curriculum as well as adhering to the exercise and nutrition guidelines. In this model the researchers had a minimal role in interacting with the participants in an effort to demonstrate low cost and left the participants to keep each other accountable. The results of the study showed participants lost an average of 2.07 lbs. with a standard deviation of 8.11 lbs. At 12 months the average change of body
weight ended up being 3.15lbs. The weight loss was significant but short of the original NDPP and was on the lower end of modified diabetes prevention programs (Dejoy et al., 2012). The main points to take from this study are the researchers were able to lower the cost of delivering the NDPP, simplify the content within the NDPP, and have little to no disruption of the normal work environment (Dejoy et al., 2012).

Another worksite wellness program that attempted to translate the NDPP into the work place was the Worksite Diabetes Prevention Program (WDPP). The purpose was to see if the NDPP could be implemented successfully in the workplace setting. Much like the other studies, the education curriculum was still based off of the materials from the original NDPP. The exercise and nutrition components were also focused on weight loss. In this program the intervention was delivered by two registered nurses and a certified health educator who would visit the workplace frequently to provide diabetes education. To ensure the safety and quality a physician oversaw the program. The means of physical activity for the participants were a free membership to the employee fitness center and the encouragement to participate in brisk walking. The result of this study did indeed show that the NDPP was successful in improving glucose tolerance and delaying onset of T2DM in pre-diabetic individuals for one year (Aldana et al., 2005). The main point that this study demonstrated was the advantage of utilizing a worksite setting to screen for pre-diabetes and diabetes as well as conduct a worksite program designed to help those who are diabetic and pre-diabetic.

The challenge that translated programs or programs that are modified face is the financial cost associated with carrying out the NDPP while maintaining efficacy. Although online access to the NDPP curriculum is free, the challenge is utilizing the right
people, method, and setting to implement the structured exercise, education, and counseling components. In many cases cost alone is not a barrier, but cost along with the resources for effective delivery becomes a problem. A possible solution to this would be to offer a translated or modified version of the NDPP as an extension to an already existing program. One program that fits the criteria to carry out the NDPP is 100 Citizens (Loy, 2012).

100 Citizens

A successful program for delivering physical activity to a pre-diabetic community is the 100 Citizens Program. The program’s model is unique and dynamic in creating a no cost sustainable model of delivering physical activity through university enrolled Kinesiology majors. 100 Citizens is a collaborative effort between the City of San Fernando Recreation and Community Services and the Kinesiology department at California State University Northridge (CSUN). The 100 Citizens program is centered towards an Adult Fitness Class and a Senior Fitness Class. Both classes are free and open for adults and older adults to join. 100 Citizens also offers various exercise classes to the community at a reduced cost. These classes range from stationary cycling (spinning) to Zumba and all take place at Recreation Park in San Fernando, California. All classes are planned and implemented by Kinesiology students from CSUN. The students are receiving internship units toward graduation or are being financially compensated for their services by the parks. The classes are delivered in Spanish and English and require minimum exercise equipment.

The focus of 100 Citizens is to address the obesity epidemic by eliminating the barriers many individuals face relative to exercise programming. Barriers such as
language, cost, convenience, lack of education and exposure, and fitness level are all addressed by having Kinesiology educated students work directly with participants. The Kinesiology students are educated in human movement and can instruct exercises with progressions and modifications to accommodate the abilities and needs of all individuals. The exercises in the classes offered emphasize improving the 5 components of fitness (Muscular endurance, muscular strength, aerobic endurance, flexibility, and body composition). In addition the program strives to exceed the minimum recommendations for physical activity set by the CDC which can lead to even greater health benefits.

Even more important is the 100 Citizens model of sustainability. The heart of sustainability is the public parks supervising the continual flow of Kinesiology interns which forms the no-cost basis of 100 Citizens. The program is focused towards the two free classes offered to the community. As participants sign up and improve their fitness levels they may decide to join the low cost classes based on interest or to further challenge themselves. The revenue generated from the low cost classes goes back into the program by paying the program director that supervises the student interns who teach the classes as well as pays for equipment. Meanwhile the student instructors who are not receiving financial compensation are able to still receive internship hours towards their degree or simply volunteer.

In this model there are several parties who benefit. First the participants of 100 Citizens benefit because they are able to improve their physical and mental wellbeing through exercise that is safe, appropriate for their ability, affordable, convenient, and in a culturally sensitive manner. The students who work, intern, or volunteer for this program also benefit because they gain valuable first-hand experience away from the classrooms.
by working with participants and instructing exercise in a community setting. It is also important to point out in this model that the community setting is much different than many of the students are accustomed to which further contributes to their personal and professional growth. The students are also working towards their degree and learn the value of their skills in addressing the growing obesity epidemic. The park benefits from having the 100 Citizens program because it establishes them as a positive environment in the community and they have a greater amount of individuals utilizing their resources. The community of San Fernando benefits because they have healthier, more active, and happier citizens. Finally Kinesiology benefits because 100 Citizens showcases the role Kinesiology must play in addressing the obesity epidemic. This is a role that cannot be replicated by other professions and compels kinesiologists to become involved in the efforts against obesity.

The model for 100 Citizens offers a potential blueprint in programing and delivering exercise to a community. Although it is not primarily focused on T2DM prevention, it has been able to engage participants to become active. The NDPP is a program that has a primary focus of preventing T2DM. By utilizing a similar model to 100 Citizens and including the resources from the NDPP an effective program can be created that maximizes the positive qualities of both programs. The goal of this study was to see if it translated from the park setting into a worksite setting for university employees.
Chapter III

Methods

Given the success of 100 Citizens, now in its third year, we offered a free 12 week worksite diabetes prevention program that followed a similar model to 100 Citizens at California State University, Northridge. The protocol for our modified worksite diabetes prevention program was similar to the original NDPP with a few modifications. First instead of a 16 week program the program was completed in 12 weeks over the summer to avoid any scheduling conflicts with the semester system the CSUN campus followed and to simulate the potential replication that would occur during a regular semester. The health education curriculum was also modified to three times a week 10 minute lectures and because of the student’s Kinesiology education, a greater emphasis on physical activity was incorporated. The participants met 3 times a week for a structured group exercise program led by volunteer undergraduate Kinesiology majors who were supervised by the lead researcher. Each exercise session was in a group setting, emphasized the 5 components of fitness (muscular endurance, muscular strength, cardiovascular endurance, flexibility, and body composition) completed at a moderate intensity. Since the primary goal was based on weight loss, the nutrition guidelines stayed consistent with the original NDPP and participants were encouraged to stay within their weekly calorie targets. The calorie targets are based on the initial body weight of the participants and were not different in either males or females. The program was also replicated in two other different communities, San Fernando and Pasadena, CA.


Participants

A total of 4 female individuals (51.0 yrs. ± 19) participated in the program. Only one participant met all the inclusionary criteria of being an adult (18-80 years), had a BMI ≥ 27 kg/m², and scored ≥ 5 on the NDEP Diabetes Risk Test. The participants were excluded in the program if they had the following exclusionary criteria: individuals who checked yes on the modified Physical Activity Readiness Questionnaire (PAR-Q) without a physician’s approval, pregnancy, unable to walk a quarter mile, currently taking medication or had a medical condition that interferes with the assessment of diabetes risk, or had an unstable body mass which was defined as gaining or losing 7 lbs. within the last 3 months.

<table>
<thead>
<tr>
<th>Participant</th>
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<td>4</td>
</tr>
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</table>

Table 1 Select Participant Demographic Characteristics

Recruitment of Students

The Lead Student Researchers sent emails to Kinesiology students subscribed to an email list regarding the opportunity to volunteer for the program. There were 14 Kinesiology student volunteers selected by the Lead Student Researchers based on their proficiency to learn and implement the program’s field tests and exercise curriculum. The Lead Student Researchers met with the student volunteers four days prior to the start of the program. In this meeting, the Lead Student Researchers distributed the structured exercise program, fitness testing protocols, and trained each student volunteer on how to implement the structured exercise program. In addition, the student volunteers arrived 10
minutes early to each session for ongoing training on delivering the structured exercise program.

Testing Protocol

A total of three screening sessions were held for all the participants two weeks before the start of the program. Participants were asked to attend one of the three sessions to learn all elements of the study, including the purpose, the format, and the duration with an assigned student volunteer. The student volunteers were assigned to a participant to complete the following stations:

- Review and sign approved Institution Review Board (IRB) informed consent form and participant’s Bill of Rights form.
- Measurement for height and weight with their clothes on but shoes off in a private area.
- Completion of the National Diabetes Education Program (NDEP) Diabetes Risk Test (independent from student volunteers) and the modified Par-Q. If the participant answered yes to any of the questions on the PAR-Q they were instructed to obtain clearance from a physician to participate in the program.
- Evaluated for blood pressure with a blood pressure monitor. Any participants who had a blood pressure reading over 144/94 were asked to obtain written clearance from a physician before participating in the program.

One week prior to the start of the program, the participants attended an orientation meeting in which they paired up with the same student volunteer from the screening session and went through various stations. The orientation session included the following stations:
- 50 question multiple choice knowledge assessment test based on the NDPP curriculum.
- Height, weight, and waist circumference measured individually in a private setting by a student volunteer.
- Flexibility evaluated with a YMCA Sit and Reach test (Thompson, Gordon, & Pescatello, 2010).
- Muscular endurance evaluated by the Push-up test (Thompson et al., 2010).
- Aerobic endurance evaluated by the YMCA step (Simon, 2006).
- A food and activity tracker and a brief lesson from one of the Lead Student Researchers on how to use the tracker.

At the midpoint of the program (18th session), a mid-testing session was completed and at the conclusion of the program (36th session), the participants met the following Monday for a post-testing session. At both testing sessions the participants followed the exact protocol as the screening session. The participants also turned in their food and activity trackers. The Lead Student Researchers answered any further questions the participants had regarding the program.

**Daily Procedure**

In a typical session, the participants met for one hour to complete structured physical activity and a health education lesson. The physical activity consisted of a 10 minute dynamic warm-up transitioning into the physical activity component which was conducted in a circuit training manner intended to maintain an elevated heart rate of moderate intensity incorporating aerobic and strength training. Strength training included the use of resistance bands and body weight exercises with 5-10 exercises for each major
muscle group (including upper body, lower body, and core). The participants engaged in 15-20 repetitions early in training with a minimum of one set to near fatigue, but as many as three to four sets were recommended during the session. Participants progressed over time to increased resistance that could only be lifted for 8-10 repetitions maximum. Aerobic exercise with the use of battle ropes and field cones were performed at a moderate-intensity similar to brisk walking (4 mph/15 minute mile) (ACSM, 2010) after the strength training component.

Finally the sessions concluded with 10 minutes of group stretching. During the stretching the health education component was verbally delivered by the Lead Student Researcher. Each lesson was based on the core curriculum of 16 sessions (compressed into 12 weekly sessions) from the Diabetes Prevention Program. Sessions were based on basic nutritional guidelines, physical activity strategies, and behavioral self-management. Participants and student volunteers were encouraged to discuss strategies, examples, and share stories of their anecdotal experiences related to the day’s topic.

All participants received a food and activity tracker which they used to log physical activity and dietary intake. The participants were taught how to log in their dietary intake and taught proper food scaling. The participants also received the Fat and Calorie Counter from the NDEP. Food and activity trackers were reviewed by the Lead Student Researchers at the end of every week. Feedback was provided to the participants if warranted. The participants were asked to follow calorie restrictions and limit their fat intake based on their initial weight:

Initial weight of 120–170 lbs. will consume 1,200 kcal/day (33 g fat)

Initial weight of 175–215 lbs. will consume 1,500 kcal/day (42 g fat)
Initial weight of 220–245 lbs. will consume 1,800 kcal/day (50 g fat)

Initial weight of over 250 lbs. will consume 2,000 kcal/day (55 g fat)

The rate of weight loss targeted for each participant was 1-2 lbs per week.

Although the calorie restriction might seem low, The U.S. Department of Agriculture and U.S. Department of Health and Human Services recommends a diet that provides a minimum of 1,800 calories per day for normal adults to meet nutritional requirements (Services, 2010). If participants are achieving their weight loss goals without following the above restrictions then the calorie restrictions were modified according to individual participant needs. The calorie intake limitation was not the goal but rather a strategy for weight loss.

**Instruments**

The instruments used for the program are listed below:

- Balance beam scale
- Omron blood pressure monitor
- Resistance bands of varying intensities
- 1ft tall field cones
- 1.5in x 30ft battle ropes
- Park benches
- Measuring tape
- Yard sticks
- Metronomes
- Aerobic steps
- Risers
• Gym mats

*Human Subjects Protocol*

This study was submitted and approved by the Human Subjects Review Board at CSUN. All participants were aware of any potential risks involved with their participation when they reviewed the informed consent forms.
Chapter IV

Results

The study began with 12 participants but only four participants attended at least 80% of the sessions and only one of the four participants was considered pre-diabetic by the program’s definition. The following results will only show the four participants who attended at least 80% of the sessions.

Participant #1

Participant #1 was a 56-year-old female who was considered pre-diabetic from the program’s criteria. The participant attended 33 of the 34 scheduled sessions and results from her weekly measurements indicate a gradual decline in weight which exceeded 7% of the initial body weight by the end of the program. The initial body weight of Participant #1 was 186lbs and at the end of the program her weight was 172lbs (Figure 1).

Although all participants completed the YMCA Step-test, Sit and Reach test, and Push-up test, the results were questionable due to unreliable methods of test administration by the research staff. Further details will be explained in the discussion.
Participant #2

Participant #2 was a 32-year-old female who was not considered pre-diabetic from the program’s criteria due to a score of 4 on the NDEP Diabetes Risk Test. The participant attended 31 of the 34 scheduled sessions and results from her weekly weight measurements indicate a gradual decline which exceeded 5% of the initial body weight by the end of the program. The initial body weight of Participant #2 was 163lbs and at the end of the program their weight was 154lbs (Figure 2).
Participant #3 was a 64-year-old female who was not considered pre-diabetic from the program’s criteria due to a score of 4 on the NDEP risk test. The participant attended 27 of the 34 scheduled sessions and results from their weekly weight measurements indicate a gradual decline but did not exceed 5% of the initial body weight by the end of the program. The initial body weight of Participant #3 was 156lbs and at the end of the program their weight was 150lbs (Figure 3).
Figure 3 Participant #3 weight chart.

**Participant #4**

Participant #4 was a 52-year-old female who was not considered pre-diabetic from the program’s criteria due to a score of 4 on the NDEP Diabetes Risk Test. The participant attended 29 of the 34 scheduled sessions and results from her weekly weight measurements indicated a gradual decline which exceeded 5% of the initial body weight by the end of the program. The initial body weight of Participant #4 was 178lbs and at the end of the program their weight was 169lbs (Figure 4).
Figure 4 Participant #4 weight chart.
Chapter V
Discussion

Field Testing

Field tests were chosen to help the researchers better understand any physical changes that may have occurred during the program although given the moderate intensity of the program, large changes were not projected for all of the variables measured nor are they an indicator of risk for developing T2DM. The student volunteers were only given one session to learn all of the field tests of the study and not every student volunteer had the capacity to do this. The importance and volume of training the student volunteers was underestimated by the researcher. The group of student volunteers ranged from second year students to fourth year students and their skills in testing varied. In future programs a more comprehensive approach needs to be taken in the training of the student volunteers and if the Kinesiology department placed a higher priority on public health and community-based programming, greater emphasis on student instruction for testing and exercise delivery would be recommended. It would also be recommended that before the mid and post-test days, the lead researcher goes through a review of the field tests and the student volunteers rehearse the procedures. With the above discussion in mind, fitness test results were approached with caution to their validity and reliability.

A modification in training or testing methods is recommended with this student volunteer population. Despite the problems with field testing the purpose of the study was not to increase the capacities of each of the 5 components of fitness or eat within the calorie targets recommended. The purpose of the study was to achieve a 5%-7% loss in
initial body weight. This was to be accomplished through a combination of education and exercise. The field tests were administered to evaluate if fitness changes occurred from their participation in the moderate intensity exercises. Regardless if changes occurred or not, by exceeding the CDC recommendations for minimum exercise, a health benefit was derived by participants. According to the CDC regular physical activity can control weight, reduce risk for cardiovascular disease, reduce risk for T2DM, and reduce risk for certain cancers ("Physical Activity and Health," 2011).

Food and Activity Tracker

Each participant was given a new Food and Activity Tracker each week to record their dietary intake and physical activity expenditure. All but one participant consistently documented and turned in their trackers. The one participant who did not consistently turn in her tracker instead used an excel spreadsheet to document her dietary intake and physical activity expenditure. The excel spreadsheet was emailed to the lead researcher but usually one to two weeks late due to the participant’s lack of time. Although the participant had issues with adhering to the recommendation of the weekly deadline, she still made an effort to document her dietary intake and physical activity. All of the participants felt the Food and Activity Trackers were helpful in keeping them accountable in what they chose to eat because they knew it would be turned in and be visible to the lead researcher.

Possible Methodological Limitations

Sample size was an issue during the program. At the start of the study there were 12 individuals who had come in to the screening and orientation sessions. Unfortunately work related obligations prevented 8 individuals from participating in the program. In
addition there was only individual who met the programs definition of pre-diabetic. Some of these participants were only one question from being considered pre-diabetic on the NDEP Risk Test. Although some individuals did not meet the pre-diabetic designation they were still welcome to participate in the program because there was the opportunity for them to reduce their risk of T2DM through lifestyle changes that was targeted for a safe weight loss. In total the 3 participants who were interested and able to attend found that they did lose weight and enjoyed their time with the program. The inclusion of the participants who were not defined as pre-diabetic kept the program group-based instead of individual-based which was comparable to the San Fernando and Pasadena locations.

The low number of eligible participants indicates the challenge of recruitment in the CSUN setting. Foremost in recruitment is marketing and notification to employees of the importance and availability of a program that anecdotal observations suggest many would benefit from their participation. Possible reasons for these challenges include: conflicting work schedules, time off for summer vacation, and a lack of incentive. A problem with offering incentives would be the economic cost of continually offering it for subsequent programs which would jeopardize the financial sustainability of the program. Although there are fewer classes during the summer, the staff and faculty still work around a schedule that conflicted with the 5:15pm-6:15pm meeting time. Organizations whenever possible need to consider the benefits to the organization of encouraging participation and attempting to adjust workloads or schedules accordingly. Additionally, three participants of the program had already planned time off for vacation and ended up missing significant time from the program. Future considerations in the recruitment need to notify potential participants earlier as well as partnering up with
organizations on campus such as the Klotz Student Health Center, the University Student Union, and the Office of Human Resources. In the worksite, there may be need for an ongoing program of education and exercise rather than a discrete 12 weeks.

The measure we used to assess diabetes risk could also have been improved through the use of glycated hemoglobin testing (HbA1c). Hb1Ac testing would have measured the average plasma glucose concentration and given an alternative and possibly more accurate measure on diabetes risk. The Hb1Ac testing process can be costly and invasive which could potentially deter participants. In addition there were limited professionals that were qualified to administer Hb1Ac testing. Future studies with adequate staffing and the financial capacity to administer Hb1Ac testing should include Hb1Ac tests.

Possible Limitations of the Researcher

Perhaps one of the most unique features of the study was the duration. Instead of following a 24 week delivery period the study was completed within 13 weeks. The DPP curriculum was modified and the exercise intervention was shorter. This gave less time for the participants in the study to achieve a 5-7% weight loss of initial body weight. The reason the study was only 13 weeks was due to the CSUN academic calendar. The study was designed to conclude as student volunteers and participants began classes again for the fall semester. The study focused on minimizing interfering with the normal academic and work schedules. Academic and fiscal calendars should be considered in future studies to maximize results while minimizing drop-outs.
Student Development

The lead graduate researcher focused on preparing student volunteers to become better exercise instructors but also as leaders. There were meetings intermittently before or after the program to discuss each one of the student volunteers’ goals, strengths, and areas of concern with their own skills or the program. Communication skills, interpersonal skills, critical thinking and basic exercise programming were all areas that the lead researcher discussed in the meetings. These types of sessions add to the value of the student internship experience. During the program student volunteers assisted in facilitating the session’s health education lesson, participated in the discussion, lead warm-up exercises, or cool-down stretching. The student volunteers found ways to be more engaging to the participants by joining in the self-monitoring of dietary intake and physical activity which helped them understand the weight loss process the participants experienced. There were two group hikes during the program to help the student volunteers bond and improve group cohesion. At the end of the program there were no internship units or compensation given to the student volunteers but they did gain a meaningful experience that relates significantly to their major and firsthand experience with a research project.

Conclusion

The purpose of the study was is to determine whether a free 12 week modified worksite diabetes prevention program can successfully yield 5%-7% weight loss in the CSUN staff and faculty who are pre-diabetic. The program was able to achieve the weight loss goal for the Participant #1 who was defined as pre-diabetic. The success is unquestionable in Participant #1 and the change in her life is evidence that the program
reduced her risk for T2DM however; the program’s ability for success in a larger sample still remains unclear because there was a low sample.

Despite a modified program of only 12 weeks, a 7% loss of initial body weight was achieved for participants 1, 2, and 4. Under the supervision of a lead researcher and Kinesiology student volunteers, the program functioned without any involvement of a physician except for those who needed their physician’s clearance. The program has the appropriate staffing to continue running because of the ongoing resource of CSUN students and it does not significantly disrupt the normal workplace environment for the staff and faculty. In addition the former student volunteers of the program develop into potential lead researchers of future programs and serve as mentors for new incoming student volunteers. A difference among other comparable programs was the constant interaction between student volunteers and participants. The two groups met three times a week and had a more specific focus on structured physical exercise.

The program was an effort to utilize the 100 Citizens model and integrate it with the NDPP at the worksite setting. The results of Participant #1 are encouraging and with the high prevalence of T2DM communities need to make similar efforts to address the epidemic. We can conclude that the model based from the 100 Citizens program along with the resources of the NDPP implemented at CSUN over a 12 week span is feasible and viable for the worksite at California State University, Northridge.
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Johnson Foundation.


FREE CSUN STAFF & FACULTY WEIGHT LOSS DIABETES PREVENTION PROGRAM

12 week free exercise, education, and monitoring program
June 17 - Sept. 6
Mon, Wed, & Fri
5:15pm-6:15pm

If interested please attend one of the initial screening sessions:
Friday June 7th 5:00pm or
Monday June 10th 5:00pm
Location: West Field
(Dirt track east of Matador Hall)

Objective Goal
5%-7% weight loss

For more information please contact:
Mike Wong
(michael.wong.74@my.csun.edu)
or
Steven Loy
(steven.loy@csun.edu)
Appendix B

California State University, Northridge
CONSENT TO ACT AS A HUMAN RESEARCH PARTICIPANT

Community-Based Diabetes Prevention Program: An Extension of 100 Citizens

You are being asked to participate in a research study. Participation in this study is completely voluntary. Please read the information below and ask questions about anything that you do not understand before deciding if you want to participate. A researcher listed below will be available to answer your questions.

RESEARCH TEAM

Researchers:
Mike Wong
Kinesiology
(607) 232-4100
michael.wong.74@my.csun.edu

Faculty Advisor:
Steven Loy, Ph. D.
Kinesiology
18111 Nordhoff St.
Northridge, CA 91330-8287
(818) 677-3220
steven.loy@csun.edu

What is the purpose of this study?
The purpose of this study is determine whether a free community-based diabetes prevention program can successfully yield 5%-7% weight loss in adults who are pre-diabetic.

Who may participate?
You are eligible to participate in this study if you are an adult aged 18-80 years of age with a BMI of 27 kg/m² or greater and score of 5 or higher on the National Diabetes Education Program (NDEP) Diabetes Risk Test.

Participants would need to be a member of the staff or faculty at CSUN.

You are not eligible to participate in this study if you:
- Mark “Yes” on the modified Physical Activity Readiness Questionnaire form
  Clearance can be granted if approved by your physician;
- Are pregnant or expect to be pregnant;
- Unable to walk 5 city blocks;
- Have a blood pressure over 140/90
Clearance can be granted if approved by your physician;
- Have gained or lost 7 lbs within the last 3 months; OR
- Already have diabetes.

How much of your time is expected?
This study will involve approximately 3 hours a week for a span of 3 months. Due to the importance of consistency in exercise for this program, we ask that you miss no more than 9 total sessions. Missing more than 9 sessions will exclude you from the program.

What does this study involve?
A screening session
1. After we have received your signed consent form and a signed bill of rights form we will measure your height and weight with your clothes on but shoes off in a private area to calculate your body mass index (BMI).
2. You will then be asked to complete the NDEP Diabetes Risk Test.
3. At this time if we confirm that your BMI is equal to or greater than 27kg/m² and you score a 5 or greater for the NDEP Diabetes Risk Test, we will ask that you complete a Physical Activity Readiness Questionnaire.
4. If you answer yes to any of the questions on the Physical Activity Readiness Questionnaire, we ask that you receive clearance from your physician to participate in the program.
5. Finally, we will evaluate your blood pressure with a device that involves wrapping a cuff around your arm. If your reading is over 144/94, talk with your doctor before participating in our program.
6. If you meet all qualifications we will invite you to join our program.

An orientation day
A week before the start of the program we will have an orientation day.
1. We will be performing baseline tests and measurements (Muscular endurance, cardiovascular, endurance, flexibility, BMI, weight, and waist circumference). These tests include:
   a) Push-up test
   b) YMCA step test
   c) YMCA Sit and Reach test
   d) Height and weight measurements
   e) Waist girth measurement
2. We will loan you a device (pedometer) that keeps track of your daily step total and teach you how it works.
3. We will give you a food and activity tracker and you will be taught how to log your daily step count and log what you eat.
4. We will give you a 50 question multiple choice knowledge assessment test to understand how much you know in regards to physical activity, nutrition, and self-behavioral management.

12 week program
1. We will be meeting for an hour 3 days a week at a designated location. Each hour session will consist of 50 minutes of physical activity and 10 minutes of health education at the end of the hour.

2. The physical activity will be conducted in a group setting intended to maintain an elevated heart rate and exercise intensity incorporating aerobic and strength training. Aerobic exercise will be performed at moderate-intensity similar to brisk walking (4 mph/15 minute mile). Strength training will include the use of resistance bands and body weight exercises with 5-10 exercises for each major muscle group (including upper body, lower body, and core). You will participate in a total body workout that includes modifications specific to your ability.

3. Following the physical activity portion, we will have 10 minutes of health education including discussion topics revolving around basic nutritional guidelines, physical activity strategies, and behavioral self-management skills. We will also educate you regarding dietary intake by giving you guidelines to limit your daily fat and calorie intake. These guidelines will be given to you as an aid to help you reach your main goal of losing 1-2 pounds of weight per week.

4. We will ask that you to engage in a minimum of 10,000 steps per day in addition to our group physical activity sessions.

5. We will ask that you track your daily caloric intake and physical activity in the food and activity trackers that we provided you. We will be sure to fully explain how you can do this. We also will review your journals each week to give you feedback and advice to help you reach your goals.

6. We will also weigh you with your clothes on but shoes off in a private area once a week on a designated day.

**Mid-Testing**

During the sixth week of the program we will have an extended session to include time to retest your baseline tests and measurements: strength, cardiovascular, endurance, flexibility, BMI, weight, waist circumference, and knowledge assessment test in the same fashion as the initial testing during orientation day.

**Post-test day**

At the conclusion of the 12 weeks, the same tests and testing steps will occur. We will then collect your food and activity tracker and pedometer and answer any further questions you may have regarding the program.

**What are the risks and discomforts of this program?**

The risk for you to participate in this program is minimal. The possible risks and/or discomforts you might experience are fatigue, boredom, dizziness, nausea, heart attack, muscle soreness, strain, sprain, broken bones, mild dehydration, and mild emotional discomfort while measuring your waist and body weight. There is also a potential for emotional distress associated with dieting. We plan to minimize these risks by including suitable progressions and modifications to you and providing regular water breaks. We plan to minimize your risk of feeling emotional discomfort by providing a private setting and keeping your information confidential. Furthermore, in the event you feel emotional distress associated with dieting, we will refer you to a counselor at your own cost if
needed. Additionally, if a medical condition arises you will be referred to private medical care at your own cost. In the event that you are injured, 9-1-1 will be called by the Lead Student Researcher and will remain with you until help arrives. Any costs incurred are your responsibility.

**What are possible benefits for participating in this program?**
The possible benefits you may experience from the procedures described in this program include weight loss, decreased Body Mass Index (BMI) values, a positive shift in well-being, improved fitness, better posture and balance, better self-esteem, stronger muscles and bones, feeling more energetic, relaxation and reduced stress, continued independent living in later life, information retention (revolved around basic nutrition, physical activity and behavioral self-management) and a decreased risk of type 2 diabetes (and other related chronic diseases).

**What are the alternatives to participation?**
If you chose to not participate in this program, there is no other alternative.

**What are the costs, reimbursements, and compensation for this program?**
You will not be paid for your participation in this program and there is no cost to you. You will not be reimbursed for any out of pocket expenses, such as parking, transportation, or any medical costs.

**WITHDRAWAL OR TERMINATION FROM THE STUDY AND CONSEQUENCES**
You are free to withdraw from this study at any time. If you decide to withdraw from this study you should notify the research team on the first page immediately. The research team may also end your participation in this study if you do not follow instructions, if you are absent for more than nine sessions, or if your safety and welfare are at risk. We will inform you immediately if this occurs.

**CONFIDENTIALITY**
Your information will be kept confidential by replacing your name with a code. A list linking the code and your identifiable information (e.g. this form) will be stored in a locked file cabinet in a secure faculty office and only the research team on the first page has access to this cabinet. The de-identified research data will be stored electronically on a computer with password protection in a secure office at all times. Storage locations for identifiable information and de-identifiable research data are both in the Department of Kinesiology at California State University, Northridge and will be kept for at least 3 years from the date of the end of the program.

Your separate consent will be required to access any information derived from this research project that personally identifies you, except as specifically required by law. Publications and/or presentations that result from this study will not include identifiable information about you.

**What if you have questions?**
If you have any comments, concerns, or questions regarding the conduct of this research please contact the research team listed on the first page of this form.

If you have concerns or complaints about the research study, research team, or questions about your rights as a research participant, please contact Research and Sponsored Projects, 18111 Nordhoff Street, California State University, Northridge, Northridge, CA 91330-8232, or phone 818-677-2901.

**VOLUNTARY PARTICIPATION STATEMENT**
You should not sign this form unless you have read it and been given a copy of it to keep. Participation in this study is voluntary. You may refuse to answer any question or discontinue your involvement at any time without penalty or loss of benefits to which you might otherwise be entitled. Your decision will not affect your relationship with California State University, Northridge. Your signature below indicates that you have read the information in this consent form and have had a chance to ask any questions that you have about the study.

_I agree to participate in the study._

______________________________  __________________
Participant Signature                    Date

______________________________
Printed Name of Participant

______________________________  __________________
Researcher Signature                    Date

______________________________
Printed Name of Researcher
The rights below are the rights of every person who is asked to be in a research study. As an experimental subject I have the following rights:

1) To be told what the study is trying to find out,

2) To be told what will happen to me and whether any of the procedures, drugs, or devices is different from what would be used in standard practice,

3) To be told about the frequent and/or important risks, side effects or discomforts of the things that will happen to me for research purposes,

4) To be told if I can expect any benefit from participating, and, if so, what the benefit might be,

5) To be told the other choices I have and how they may be better or worse than being in the study,

6) To be allowed to ask any questions concerning the study both before agreeing to be involved and during the course of the study,

7) To be told what sort of medical treatment (if needed) is available if any complications arise,

8) To refuse to participate at all or to change my mind about participation after the study is started. This decision will not affect my right to receive the care I would receive if I were not in the study.

9) To receive a copy of the signed and dated consent form.

10) To be free of pressure when considering whether I wish to agree to be in the study.

If I have other questions I should ask the researcher or the research assistant, or contact Research and Sponsored Projects, California State University, Northridge, 18111 Nordhoff Street, Northridge, CA 91330-8232, or phone (818) 677-2901.
Appendix D

Regular physical activity is fun and healthy, and increasingly more people are starting to become more active every day. Being more active is very safe for most people. However, some people should check with their physician before they start becoming more physically active. Please complete this form as accurately and completely as possible.

### PAR-Q FORM

Please mark YES or NO to the following:

<table>
<thead>
<tr>
<th>Question</th>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Has your doctor ever said that you have a heart condition and recommended only medically supervised physical activity?</td>
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<td></td>
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<tr>
<td>Do you frequently have pains in your chest when you perform physical activity?</td>
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<tr>
<td>Have you had chest pain when you were not doing physical activity?</td>
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<td></td>
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<tr>
<td>Have you had a stroke?</td>
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<td></td>
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<tr>
<td>Do you lose your balance due to dizziness or do you ever lose consciousness?</td>
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<tr>
<td>Do you have a bone, joint or any other health problem that causes you pain or limitations that must be addressed when developing an exercise program (i.e., diabetes, osteoporosis, high blood pressure, high cholesterol, arthritis, anorexia, bulimia, anemia, epilepsy, respiratory ailments, back problems, etc.)?</td>
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</tr>
<tr>
<td>Are you pregnant now or have given birth within the last 6 months?</td>
<td></td>
<td></td>
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<tr>
<td>Do you have asthma or exercise induced asthma?</td>
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<tr>
<td>Do you have low blood sugar levels (hypoglycemia)?</td>
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<tr>
<td>Do you have diabetes?</td>
<td></td>
<td></td>
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<tr>
<td>Have you had a recent surgery?</td>
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</tr>
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</table>

If you have marked YES to any of the above, please elaborate below:

__________________________________________________________________________

__________________________________________________________________________

Do you take any medications, either prescription or non-prescription, on a regular basis? Yes/No

What is the medication for?

__________________________________________________________________________

How does this medication affect your ability to exercise or achieve your fitness goals?

__________________________________________________________________________

Please note: If your health changes such that you could then answer YES to any of the above questions, tell your trainer/coach. Ask whether you should change your physical activity plan.

I have read, understood, and completed the questionnaire. Any questions I had were answered to my full satisfaction.

Print Name __________________________ Signature __________________________

Date: _______________________________
Appendix E

Community Based Diabetes Prevention Program Exercise Curriculum

**Week 1:**

**Monday**

<table>
<thead>
<tr>
<th><strong>Upper Body:</strong></th>
<th><strong>Lower Body:</strong></th>
<th><strong>Core:</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Push-ups (mats or wall) &amp; Forward rows (resistance bands)</td>
<td>Squats &amp; Stationary lunges</td>
<td>Sit-ups (mats) &amp; Oblique twists (mats)</td>
</tr>
<tr>
<td>Bicep curls (resistance bands) &amp; Tricep extensions (resistance bands)</td>
<td>Hip abductions (mats) &amp; Hip adductions (mats)</td>
<td>Back extensions (mats) &amp; Planks (mats)</td>
</tr>
</tbody>
</table>

**Cardio:**

Agility drills (cones), jumping jacks/euro jacks, high knees, heel kicks, jogging/brisk walking

**Wednesday**

<table>
<thead>
<tr>
<th><strong>Upper Body:</strong></th>
<th><strong>Lower Body:</strong></th>
<th><strong>Core:</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Horizontal shoulder adductions (resistance bands) &amp; Horizontal shoulder abductions (resistance bands)</td>
<td>Straight leg deadlifts (resistance bands) &amp; Wall sits (wall)</td>
<td>Bicycles (mats) &amp; Bird dogs (mats)</td>
</tr>
<tr>
<td>Upright rows (resistance bands) &amp; Overhead rows (resistance bands)</td>
<td>Side step squats &amp; Walking lunges</td>
<td>Crunches (mats) &amp; Side planks (mats)</td>
</tr>
</tbody>
</table>

**Cardio:**

Agility drills (ladder), mountain climbers, crawls, quick feet, jogging/brisk walking

**Friday**

<table>
<thead>
<tr>
<th><strong>Upper Body:</strong></th>
<th><strong>Lower Body:</strong></th>
<th><strong>Core:</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Horizontal arm curls (resistance bands) &amp; Chest press (resistance bands)</td>
<td>Squats &amp; Stationary lunges</td>
<td>Sit-ups (mats) &amp; Oblique twists (mats)</td>
</tr>
<tr>
<td>Pronated grip bicep curls (resistance bands) &amp; Tricep extensions (resistance bands)</td>
<td>Hip abductions (mats) &amp; Hip adductions (mats)</td>
<td>Back extensions (mats) &amp; Planks (mats)</td>
</tr>
<tr>
<td>Cardio:</td>
<td></td>
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<tr>
<td>Rope Swings (battle rope), Jumping/euro jacks, high knees, heel kicks, jogging(brisk walking</td>
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</tbody>
</table>
### Week 2:

#### Monday

**Upper Body:**
- Front and lateral raises (resistance bands) &
- Straight arm rows (resistance bands)

**Lower Body:**
- Side step squats &
- Walking lunges and twists

**Core:**
- Knee/leg raises (mats) &
- Single glute curls (mats and partners)

**Cardio:**
- Agility drills (cones), jumping jacks/euro jacks, high knees, heel kicks, jogging/brisk walking

#### Wednesday

**Upper Body:**
- Push-ups (mats or wall) &
- Forward rows (resistance bands)

**Lower Body:**
- Squats (partners) &
- Stationary lunges (partners)

**Core:**
- Sit-ups (mats and partners) &
- Oblique crunches (mats)

**Cardio:**
- Agility drills (ladder), mountain climbers, crawls, quick feet, jogging/brisk walking

#### Friday

**Upper Body:**
- Horizontal shoulder adductions (partners) &
- Horizontal shoulder abductions (partners)

**Lower Body:**
- Straight leg deadlifts (resistance bands) &
- Wall sits (wall)

**Core:**
- Bicycles (mats) &
- Bird dogs (mats)

**Cardio:**
- Rope Swings (battle rope), Jumping/euro jacks, high knees, heel kicks, jogging/brisk walking
### Week 3:

<table>
<thead>
<tr>
<th><strong>Upper Body:</strong></th>
<th><strong>Lower Body:</strong></th>
<th><strong>Core:</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Horizontal arm curls (resistance bands) &amp; Inclined chest press (resistance bands)</td>
<td>Squats (resistance band) &amp; Stationary lunges</td>
<td>Sit-ups (mats) &amp; Oblique twists (mats)</td>
</tr>
<tr>
<td>Pronated grip bicep curls (resistance bands) &amp; Tricep extensions (resistance bands)</td>
<td>Hip abductions (mats) &amp; Hip adductions (mats)</td>
<td>Back extensions (mats) &amp; Planks (mats)</td>
</tr>
</tbody>
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**Cardio:**
Agility drills (cones), jumping jacks/euro jacks, high knees, heel kicks, jogging/brisk walking

### Wednesday

<table>
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<tr>
<th><strong>Upper Body:</strong></th>
<th><strong>Lower Body:</strong></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Front and lateral raises (partners) &amp; Straight arm rows (resistance bands)</td>
<td>Walking squats (duck walks) &amp; Walking lunges and twists</td>
<td>Knee/leg raises (mats) &amp; Single glute curls (mats and partners)</td>
</tr>
<tr>
<td>Internal shoulder rotations (resistance bands) &amp; External shoulder rotations (resistance bands)</td>
<td>Romanian deadlifts (resistance bands) &amp; Wall sits (wall)</td>
<td>Cross body crunches (mats) &amp; Side planks (mats)</td>
</tr>
</tbody>
</table>

**Cardio:**
Agility drills (ladder), mountain climbers, crawls, quick feet, jogging/brisk walking

### Friday

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<th><strong>Upper Body:</strong></th>
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<tbody>
<tr>
<td>Push-ups (mats or wall) &amp; Forward rows (resistance bands)</td>
<td>Squats (partners) &amp; Stationary lunges (partners)</td>
<td>Sit-ups (mats and partners) &amp; Oblique crunches (mats)</td>
</tr>
<tr>
<td>Bicep curls (resistance bands) &amp; Tricep extensions (resistance bands)</td>
<td>Hip abductions (mats) &amp; Hip adductions (mats)</td>
<td>Back extensions (mats) &amp; Planks (mats)</td>
</tr>
</tbody>
</table>

**Cardio:**
Rope Swings (battle rope), Jumping/euro jacks, high knees, heel kicks, jogging/brisk walking
### Week 4:

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<th><strong>Core:</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Horizontal shoulder adductions (resistance bands) &amp; Horizontal shoulder abductions (resistance bands)</td>
<td>Straight leg deadlifts (resistance bands) &amp; Wall sits (wall)</td>
<td>Bicycles (mats) &amp; Bird dogs (mats)</td>
</tr>
<tr>
<td>Upright rows (resistance bands) &amp; Overhead rows (resistance bands)</td>
<td>Side step squats &amp; Walking lunges</td>
<td>Crunches (mats) &amp; Side planks (mats)</td>
</tr>
</tbody>
</table>

**Cardio:**
Agility drills (cones), jumping jacks/euro jacks, high knees, heel kicks, jogging/brisk walking

### Wednesday

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<th><strong>Upper Body:</strong></th>
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</thead>
<tbody>
<tr>
<td>Horizontal arm curls (resistance bands) &amp; Chest press (resistance bands)</td>
<td>Squats &amp; Stationary lunges</td>
<td>Sit-ups (mats) &amp; Oblique twists (mats)</td>
</tr>
<tr>
<td>Pronated grip bicep curls (resistance bands) &amp; Tricep extensions (resistance bands)</td>
<td>Hip abductions (mats) &amp; Hip adductions (mats)</td>
<td>Back extensions (mats) &amp; Planks (mats)</td>
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**Cardio:**
Agility drills (ladder), mountain climbers, crawls, quick feet, jogging/brisk walking

### Friday

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<td>Knee/leg raises (mats) &amp; Single glute curls (mats and partners)</td>
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<td>Internal shoulder rotations (resistance bands) &amp; External shoulder rotations (resistance bands)</td>
<td>Romanian deadlifts (resistance bands) &amp; Wall sits (wall)</td>
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**Cardio:**
Rope Swings (battle rope), Jumping/euro jacks, high knees, heel kicks, jogging/brisk walking
Appendix F

Name:
Date:
Program location:

Knowledge Assessment Test

The following questions will revolve around nutrition, physical activity and self-behavioral management information. Please choose the best possible answer.

Multiple Choice

1. What is type 2 diabetes?
   a. High pressure exerted on the walls of the arteries.
   b. Painful inflammation and stiffness of the joints.
   c. It is a disease caused by having too little sugar in the blood. The sugar in the blood is called glucose.
   d. It is a disease caused by having too much sugar in the blood. The sugar in the blood is called glucose.

2. How much physical activity (minimally) should you get each week?
   a. I should get as much exercise as possible throughout the week.
   b. I should get at least 150 minutes of moderate-intensity exercise per week.
   c. I should get at least 75 minutes of the moderate-intensity per week.
   d. I shouldn’t have to exercise if I am already skinny.

3. I should engage in regular exercise because:
   a. It helps me maintain my weight.
   b. It helps me avoid some chronic diseases.
   c. Gives me more energy throughout the day.
   d. It helps me engage in more activities with my family.
   e. All of the above

4. How many calories equals one pound of fat?
   a. 1,500 calories
   b. 3,000 calories
   c. 2,200 calories
   d. 3,500 calories

5. How many calories are in one gram of fat?
   a. 4 calories
   b. 7 calories
   c. 9 calories
   d. 12 calories
6. What is the first thing you should look at when reading a food label?
   a. Calories
   b. Serving size
   c. Total fat
   d. Total carbohydrates

7. How can I eat healthier?
   a. Set up a regular pattern of eating
   b. Eat slowly
   c. Serve smaller portions
   d. Eat with others and avoid doing something that will distract yourself
   e. All of the above

8. Which of the following food items is considered the healthiest option?
   a. Turkey bacon
   b. Regular tortilla chips
   c. 2% or whole milk
   d. Yogurt with sugar
   e. ¼ cup cooked dry beans, lentils or peas

9. Regardless of your current weight, what is the minimum amount of calories you should eat per day in order to maintain a healthy well-balanced diet?
   a. 1,200 calories
   b. 1,500 calories
   c. 2,500 calories
   d. 3,500 calories

10. What method of cooking food should be avoided?
    a. Boil
    b. Grill
    c. Bake
    d. Steam
    e. Fry

11. If you cannot fit 20-30 minutes of exercise on any given day, what should you do?
    a. Break up the exercise into 10 minute blocks 3 times a day
    b. Break up the exercise into 15 minutes blocks 2 times a day
    c. Replace time spent doing other activities like watching 30 minutes of TV
    d. Walk briskly to the grocery store that is at least 20-30 minutes away
    e. All of the above

12. When thinking about stretching, what should be avoided?
    a. Engage in a short warm-up before stretching
    b. Hold the stretch for 15 to 30 seconds
    c. Breath slowly and naturally
13. If you get a sprain, strain, “pull” or bruise, what should you do?
   a. Rest, Ice, Compression, Elevation
   b. Stop exercising
   c. Exercise as little as possible even if it is less than the daily requirement
   d. Don’t do anything. Pain is part of exercising

14. When should you stop exercising?
   a. I feel pressure, pain and heaviness in my chest
   b. I feel pain in my shoulders, arms, neck or back
   c. Pain in my chest does not leave even after I stop exercising
   d. I feel nauseous and feel faint
   e. All of the above

15. Sometimes eating habits are created by triggers. These triggers are known as cues. Which is considered a food cue?
   a. Hunger
   b. What were are feeling or thinking
   c. What others say and do
   d. Watching TV
   e. All of the above

16. Food cues could lead to overeating or eating high-fat foods. How can you change the way you react to a food cue in order to avoid overeating?
   a. There is nothing I can do.
   b. If I eat too much because of a food cue then I will exercise more later to burn the calories
   c. Keep high-fat foods out of the house and out of the work place
   d. Pinch yourself when you think about eating a high-fat food

17. When shopping at the grocery store, how can you avoid unhealthy food cues?
   a. Make a healthy-food choice shopping list and stick to it
   b. Avoid shopping when you are hungry
   c. Avoid sections of the store that tempt you
   d. All of the above

18. There is a 5 step model for problem solving. What is step number one?
   a. Apply and use the plan to solve the problem
   b. Make action plan with picked solution
   c. Pick one of your many solutions to try in order to solve the problem
   d. List possible solutions to solve problem
   e. Identifying and describing the problem
19. There is a 5 step model for problem solving. What is step number two?
   a. Apply and use the plan to solve the problem
   b. Make action plan with picked solution
   c. Pick one of your many solutions to try in order to solve the problem
   d. List possible solutions to solve problem
   e. Identifying and describing the problem

20. There is a 5 step model for problem solving. What is step number three?
   a. Apply and use the plan to solve the problem
   b. Make action plan with picked solution
   c. Pick one of your many solutions to try in order to solve the problem
   d. List possible solutions to solve problem
   e. Identifying and describing the problem

21. There is a 5 step model for problem solving. What is step number four?
   a. Apply and use the plan to solve the problem
   b. Make action plan with picked solution
   c. Pick one of your many solutions to try in order to solve the problem
   d. List possible solutions to solve problem
   e. Identifying and describing the problem

22. There is a 5 step model for problem solving. What is step number five?
   a. Apply and use the plan to solve the problem
   b. Make action plan with picked solution
   c. Pick one of your many solutions to try in order to solve the problem
   d. List possible solutions to solve problem
   e. Identifying and describing the problem

23. When going out to eat, how can you plan ahead in order to make a healthier food choice?
   a. Go on the restaurants website and look for low-fat or low-calorie options
   b. You should order what you want
   c. Pick the cheapest item on the menu
   d. Order last so you can compare your choice to the other people at the table
   e. None of the above

24. When going out to eat, how can you control the portion size in order to restrict calorie intake?
   a. Order a small size like a kids meal or a half order
   b. Share one meal with another person
   c. Order a meal and put half of it in a to-go box before you start eating
   d. All of the above
25. If you feel full after eating part of a meal in a restaurant, what can you do in order to avoid picking at the leftovers?
   a. Leave the plate of leftovers on the table. You will not be tempted to pick at it since you are already full
   b. Ask the server or bus-boy to remove the plate
   c. Go to the bathroom
   d. None of the above

26. What is a good tip in order to restrict calories from a restaurant meal?
   a. Avoid using sauces
   b. Think about what you really need to eat instead of what you want to eat
   c. Trim fat off meat
   d. Take skin off chicken
   e. All of the above

27. Slips are times when we do not follow our plans for healthy eating and exercise. What is a cause for a slip?
   a. Negative feelings
   b. Being dumped by your boyfriend or girlfriend
   c. Being bored
   d. Being happy
   e. All of the above

28. Will a slip in healthy eating and exercise always ruin your chances of losing weight?
   a. No because slips are part of being human
   b. No because what hurts our progression is the way we react to the slip
   c. Yes because every slip adds up
   d. Yes because the moment I slip is the moment I give up on myself
   e. Both A and B
   f. Both C and D

29. After you slip from healthy eating and exercise, what should you do in order to get back on track?
   a. Talk to someone supportive
   b. Have negative thoughts
   c. Exercise twice as hard. You must punish yourself
   d. Don’t do anything

30. What is stress?
   a. Stress is a positive emotion
   b. Stress happens to weak people
   c. Stress is a part of life and occurs when we tense up in response to pressure
   d. Stress is a contagious disorder

31. Stress can be an unhealthy part of life. How can you prevent stress?
   a. Share some of your workload with others
b. Make realistic schedules in order to meet your goals  
c. Be physically active  
d. Reach out to people for support  
e. All of the above  
f. None of the above

32. What should you do if you feel stressed?  
a. Take a 10-minute break  
b. Overeat until you feel better  
c. Think about all the things that are creating stress  
d. Take out your frustrations on someone you care about

33. What is a social cue?  
a. Good manners in the company of strangers  
b. Learned facts about your close friends  
c. Occasions that trigger you to behave a certain way  
d. Instances where you remember the past

34. Sweets are off limits to those with diabetes.  
a. True  
b. False

35. All social cues are bad for healthy eating and being active.  
a. True  
b. False

36. An effective strategy for handling a social cue is  
a. Avoiding the social cues at all costs  
b. Plan ahead and form strategies  
c. Accept that there is little you can do  
d. None of the above

37. An example of a negative thought is:  
a. “I’m so angry at myself for eating that cupcake!”  
b. “I have to buy these cookies just in case friends drop in.”  
c. “Martin lost two pounds this week, and I only lost one.”  
d. “This program is too hard. I might as well forget it.”  
e. All of the above.

38. True or False: Recent studies have shown that diabetes is linked to Alzheimer’s disease.  
a. True  
b. False

39. A good method to help stop negative thoughts is:  
a. Overeat until I feel better
b. Talking to a friend who has worse negative thoughts
c. Asking your friend to give you a compliment
d. Talking back with a positive thought

40. True or False: People with chronic diabetes often suffer memory loss.
   a. True
   b. False

41. True or False: A person who has been diagnosed with diabetes will have to pay more for life insurance than a person who is completely healthy.
   a. True
   b. False

42. True or False: Increasing aerobic activity will not make it easier for me to do things like walking up stars while carrying groceries.
   a. True
   b. False

43. F.I.T.T. stands for:
   a. Fun, Interesting, Training, Testing
   b. Fitness
   c. Frequency, Intensity, Time, Type
   d. None of the above

44. Aerobic fitness means:
   a. That my heart does a good job of pumping oxygen through my blood to my other muscles
   b. That I can do aerobics without ever getting tired
   c. That I can do a lot of repetitions of an exercise
   d. That I can sweat a lot

45. Type 2 diabetes can lead to:
   a. Cardiovascular disease
   b. Blindness
   c. Kidney and nerve disease
   d. Amputations
   e. All of the above

46. True or False: Nothing can prevent me from getting diabetes because both of my parents have diabetes.
   a. True
   b. False

47. What is a way you can increase your step count per day?
   a. Park your car far when going out
   b. Take the stairs instead of the elevator
c. Walk your kids to school
d. All of the above
e. None of the above

48. True or false: dancing is considered cardio.
   a. True
   b. False

49. True or false: Recording on a food-and-activity-tracker helps you stay on track and avoid slips.
   a. True
   b. False

50. If you dislike a certain physical activity, what should you do?
   a. Keep doing it because it is good for your health
   b. Stop doing it because there is no point in doing it if I dislike it
   c. Engage in something that is fun and just as beneficial
   d. None of the above
Appendix G

Data Collection Form

Name: _____________________________________________
Date: __________
Location: __________________

☐ Consent form
☐ Bill of rights

Age: __________
Height: __________
Weight: __________
Waist Circumference: __________
Blood Pressure: __________
NDEP Risk Test Score: __________
BMI: __________

☐ PAR-Q completed
☐ Not pregnant
☐ Ability to walk 5 city blocks
☐ Stable body mass (± 7lbs in the last 3 months)

Field test results

Sit and Reach: __________
Push-up: __________
Step test:
  o HR: __________
  o Duration: __________
Knowledge assessment score: __________