A FREE COMMUNITY-BASED DIABETES PREVENTION PROGRAM: AN EXTENSION OF 100 CITIZENS FOR A HISPANIC POPULATION

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For the degree of Master of Science in Kinesiology

By

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ABSTRACT

A FREE COMMUNITY-BASED DIABETES PREVENTION PROGRAM: AN EXTENSION OF 100 CITIZENS FOR A HISPANIC POPULATION

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The aim of this study was to determine whether a free 12-week modified diabetes prevention program, implemented in Recreation Park, San Fernando, California, can successfully yield a 5%-7% weight loss in participating prediabetic adults, in turn reducing or delaying the onset of type 2 diabetes.

Eligible participants were 18-80 years of age, had a body mass index greater than or equal to 30 kg/m² (obese) and scored a five or greater on the National Diabetes Education Program (NDEP) Diabetes Risk Test. The independent variables of this study consisted of an exercise program inclusive of: resistance training, moderate intensity aerobic training, and health education lessons modified from the National DPP curriculum. The dependent variable and primary marker for success was percent weight loss.

The program consisted of three individual hour long sessions, each week, for 12 weeks. With a final number of 35 sessions, each week totaled 150 minutes of structured moderate-intensity exercise and 30 minutes of health education lessons. Intended to
maintain an elevated heart rate and exercise intensity, the circuit-training style group exercise sessions incorporated aerobic and strength training. Delivered in both English and Spanish, the health education classes covered topics ranging from basic nutritional recommendations, physical activity approaches and behavioral self-management strategies.

Following dietary guidelines consistent with the National DPP, participants were instructed to monitor their daily physical activity, calorie intake and fat intake through the use of the DPP Fat-and-Calorie-Counter and food-and-activity trackers. Participants were also asked to limit their calorie and fat intake based on their initial weight. The pace of weight loss was targeted for each participant at 1-2 pounds per week.

At the conclusion of the 12-week intervention, 6 participants completed the required program. Fifty percent of the participants achieved the weight loss goal of 5% (or greater). Findings of this study were comparable to the original DPP where 50% of the 1,079 qualified participants achieved the 7% weight loss goal in 24 weeks. These results established that a modified diabetes prevention program developed for a target prediabetic population, could achieve a 5% - 7% weight loss in participating adults.
CHAPTER I

Introduction

Diabetes is the 7th leading cause of death in the United States; in 2010, 25.8 million Americans were diagnosed with type 2 diabetes (CDC, 2011). Related, it is estimated that an additional 79 million Americans have prediabetes, characterized by blood glucose levels above normal, thus greatly increasing their risk for developing type 2 diabetes (CDC, 2011). For those born in the year 2000 or later, in part due to increasing obesity and sedentary trends, it is estimated one in three Americans will develop diabetes and closer to 50% in high-risk ethnic groups (Narayan, Boyle, Thompson, Sorensen & Williamson, 2003).

Type 2 diabetes is a metabolic disorder characterized by high blood glucose levels in the context of insulin resistance and inadequate compensatory insulin secretion (ACSM & ADA, 2010). Without regulation of circulating blood glucose, elevated concentrations can contribute to increased premature morbidity and mortality. High glucose levels can contribute to additional complications such as heart disease, stroke, hypertension, blindness, kidney disease, neuropathy, lower limb amputations, dental disease and pregnancy complications (ADA, 2011; CDC, 2011). Obesity is the principal preventable cause of type 2 diabetes with more than 80 percent of people who have type 2 diabetes being overweight. Excess body weight has been shown to decrease the effectiveness of insulin, the hormone which would otherwise assist in the uptake of blood glucose into the cells (Los Angeles Department of Public Health, 2012; National Institutes of Diabetes and Digestive and Kidney Diseases, n.d.) resulting in higher than normal blood glucose levels.
Fortunately type 2 diabetes is reversible and preventable through significant lifestyle changes involving improved dietary modifications and increased physical activity participation. The combination of both, leading to moderate weight loss, can serve as an effective tool in the treatment of type 2 diabetes (ACSM & ADA, 2010; CDC, 2011). Participation in physical activity and achieving moderate weight loss will improve insulin function eliminating complications of high blood glucose levels.

Of the varying ethnicities suffering with type 2 diabetes, the Hispanic population is one of growing concern. As of 2011, 11.8% of Hispanics suffered from diabetes and when compared to non-Hispanic whites, Hispanics are at a 66% higher risk for being diagnosed with diabetes (ADA, 2011; CDC, 2011). Furthermore, Hispanics have a higher prevalence of obesity with 31.6% of Hispanics in Los Angeles County classified as obese (Los Angeles Department of Public Health, 2012). Although the involvement of dieting and exercise has been shown to help delay the onset of type 2 diabetes, many Hispanics have skewed perceptions of the benefits of such interventions (DPP Research Group, 2002; Jezewski & Poss, 2002). Many felt they were getting adequate exercise through housework and job duties and felt it unnecessary to adhere to additional regular exercise. Some believed that the cause of developing type 2 diabetes was a result of experiencing a high emotional event (Jezewski & Poss, 2002). False perceptions of type 2 diabetes, increasing obesity and increasing type 2 diabetes trends support the need to implement a healthy diet and exercise routine complemented with appropriate education.

The prevalence of diabetes is a growing issue and identifying a viable solution to prevent diabetes must be a priority. Research has indicated that lifestyle interventions are feasible solutions and are key in preventing or delaying the onset of diabetes. Reducing
total body weight by 5-7% and engaging in a minimum of 150 minutes of moderate intensity exercise (similar to walking at 4 miles per hour) can reduce the incidence of type 2 diabetes by 58% (ACSM & ADA, 2010; CDC, 2011; DPP Research Group, 2002).

Although there have been individually tailored community-based diabetes prevention programs for high-risk Hispanics, it is unknown whether a free diabetes prevention program, planned, coordinated and delivered by Kinesiology educated university students, can successfully yield comparable results. Thus, the purpose of this study was to determine whether a free 12-week modified diabetes prevention program, implemented in San Fernando Recreation Park by Kinesiology students, can successfully yield a 5%-7% weight loss in participating pre-diabetic adults, in turn reducing or delaying the onset of type 2 diabetes.
CHAPTER II

Literature Review

A noteworthy program, titled the Diabetes Prevention Program Group, was designed utilizing a number of observational studies and three intervention studies all suggesting a lifestyle intervention might decrease the risk of developing type 2 diabetes (DPP Research Group, 2002). Although not randomized, one of those studies by Erriksson and colleagues (1991) spanning 5 years, concluded that changes in lifestyle in both increased physical activity and weight loss contributed to the reduction in the risk of type 2 diabetes and of equal importance, determined that a long-term diet and exercise intervention is scalable to a larger population. Based on these findings, the Diabetes Prevention Program Research Group chose to include a lifestyle arm in their trial and focused on increasing weight loss and physical activity.

Since first initiating the Diabetes Prevention Program (DPP) in 1996, two randomized trials have been published and reported encouraging results from similar lifestyle interventions. The first, by the Da Qing IGT and Diabetes Study, was designed to determine whether diet and exercise interventions in those with impaired glucose tolerance (IGT) may delay the development of type 2 diabetes and additional diabetic complications. A total of 577 men and women, classified with IGT, were randomized into one of three intervention arms: exercise, diet or exercise plus diet (Pan et al., 1997). Although the subjects were taught and encouraged the exercise component, they were not supervised. Their results showed a reduction in the risk of developing diabetes by 31% in the diet group, 46% in the exercise group and 42% in the diet-plus-exercise group over a 6-year period.
The second randomized trial, the Finnish Diabetes Prevention Study (Lindstrom et al., 2003), was designed to determine the effects of a long-term diet and exercise behavior intervention in participants who were overweight and classified with IGT. A total of 522 middle-aged subjects received individualized dietary counseling from a nutritionist; additionally they were offered individually tailored progressive circuit-style training sessions and advised to increase their overall physical activity. The conclusion of the study showed a 58% reduction in the risk of type 2 diabetes within the first year and a 43% reduction in relative risk 7 years later (DPP Research Group, 2002; Lindstrom et al., 2003; Lindstrom et al., 2006). These findings helped further demonstrate the efficacy and sustainability of a lifestyle intervention as a feasible tool in preventing or delaying type 2 diabetes.

The Diabetes Prevention Program Group developed a lifestyle intervention focused on weight loss requiring a modified dietary intake and increased overall physical activity. The Diabetes Prevention Program (DPP) was a 27-center randomized clinical trial designed to determine the efficacy and effectiveness of interventions that could potentially delay or prevent diabetes in people with high risk for type 2 diabetes (DPP Research Group, 2000). A final number of 3,234 participants with IGT were randomized to standard lifestyle plus pharmacological metformin, standard lifestyle plus placebo or to an intensive program of lifestyle modification (DPP Research Group, 1999). Participants in the intensive lifestyle protocol were involved with a goal-based behavioral intervention that focused on primarily two goals: 1. Achieve a 7% weight loss compared to initial body weight and 2. Complete at least 150 minutes of moderate intensity (similar to brisk walking) physical activity. Both goals were chosen because evidence from other studies
supported its feasibility, effectiveness and was safe for long-term maintenance (DPP Research Group, 2002). Participants were also encouraged to achieve their weight loss goal within the first 6 months. To assist in exercise adherence, each clinical center offered supervised physical activity sessions at least two times per week, however, though encouraged and lead by a trained DPP staff member, attendance was not mandatory.

The DPP used an individual model of treatment of managers called “lifestyle coaches”. These lifestyle coaches (majority were registered dieticians while others had a Master’s degree in exercise physiology, behavioral psychology, or health education) were assigned to a clinical center and lead approximately 40 participants. Lifestyle coaches were in charge of delivering the core curriculum, conducting post-core maintenance sessions and motivating the participants in achieving their lifestyle goals.

The core curriculum was completed within the first 6 months of the lifestyle intervention. Participants were required to attend the DPP’s 16-session core curriculum that ensured all participants were taught the same basic information about behavioral self-management, physical activity and nutrition. Participants were also instructed to self-monitor their daily fat (restricted to 25% of total calorie intake), calorie intake (reduced daily caloric intake of 500-1000 kilocalories depending on their initial body weight) and their total minutes of exercise; self-monitoring was stressed as one of the most important strategies for significantly changing diet and exercise behaviors (DPP Research Group, 2002).

At the completion of the first 6 months, participants were required to be seen face-to-face at least once every 2 months for the remainder of the initial program (totaling
a 2 2/3-year period). Lifestyle coaches were encouraged to meet with their participants as often as needed to support participant adherence and assist with problem-solving. Non-adherent participants were also given a “toolbox” of strategies to identify specific barriers and find possible solutions in order to maintain weight loss and exercise adherence.

At the completion of the study, the DPP found that the lifestyle and metformin interventions were successful in delaying or preventing the onset of type 2 diabetes in high-risk individuals. Although both were successful the lifestyle intervention reduced the incidence of type 2 diabetes by 58% as compared to the standard metformin intervention only reducing the incidence by 31% (DPP Research Group, 2002). In a 7 year follow-up the incidence of diabetes for the metformin intervention maintained an 18% reduction and the lifestyle intervention maintained a 34% reduction (DPP Research Group, 2009; DPP Research Group, 2012). Although weight loss was the predominate predictor of a lower incidence, increased physical activity seems to play a role in preventing type 2 diabetes across ethnic groups and in both sexes (ACSM & ADA, 2010).

The success of the efficacy based DPP led to multiple adapted interventions attempting to demonstrate the effectiveness within a community-based setting. Kramer and colleagues (2011) published their findings in a community-based diabetes prevention program delivered by trained diabetes educators. This one year study for 81 pre-diabetic participants was a 12-session group lifestyle intervention with the same goals for weight loss (7%) and physical activity (150 minutes per week) as the DPP. Participants met weekly at the outpatient hospital-based clinics with each session lasting approximately 1 hour; all participants received handouts inclusive of weekly self-monitoring booklets, a fat-and-calorie tracking book and a pedometer in order to aid in weight-loss (Kramer,
Mcwilliams, Chen, & Siminerio, 2011). Although the same physical activity guidelines were recommended, physical activity sessions were not provided and participants self-reported physical activity. At the conclusion of the first 12 weekly sessions, participants were invited to attend group meetings once a month (for an additional 9 months) for weigh-in, collection of physical activity minutes and review of pertinent topics. This program was successful and saw significant weight loss; 26 participants (32.1%) reached their 7% weight loss and another 34 (42.0%) achieved a 5% weight loss having occurred within the first 3-4 months. These findings helped demonstrate the effectiveness of a community-based diabetes prevention program aiding in reducing the prevalence of diabetes in high-risk individuals.

While some researchers preferred only face-to-face interaction, others used the internet to provide similar yet cost effective lifestyle interventions. The University of Pittsburgh developed a web-based intervention that automated and standardized much of the counseling process. This one year pilot program enrolled 50 patients from a large academic general internal practice. Adapted from the DPP’s lifestyle curriculum, they modified the 16 weekly sessions into 8 monthly lessons presented through e-mail prompts; along with electronic counseling, participants were provided weekly self-monitoring diet, physical activity and weight logs (McTigue et al., 2009). Other resources included links from other reputable web-based information such as recipes from the American Heart Association and locations of nearby parks and trails. Researchers of this study also found success; 31% of these participants had at least a 5% weight loss and 18% achieved at least a 7% weight loss (having achieved most of the weight loss within the first 3 months). Although this internet-based lifestyle intervention was successful, the
heavy dependence on technology limits the feasible for those who do not possess the required technological resources.

Recognizing this issue, additional attempts to implement a cost-effective and feasible community-based diabetes prevention program were administered. Ackermann and colleagues (2008) developed a group-based lifestyle intervention in partnership with the YMCA. This one year pilot study was conducted to test the hypotheses that YMCA wellness instructors could be trained and implement a similar DPP based lifestyle intervention; researchers felt capable of targeting a larger population of pre-diabetic individuals still finding similar body weight changes comparable to the DPP. Goals for the 46 enrolled intervention participants included a 5% - 7% reduction in body weight and 150 minutes of moderate intensity physical activity through a 16 classroom-style core curriculum covering goal setting, self-monitoring and problem solving. After 6 months, mean body weight decreased by 6% (equating to a mean weight loss of 12.5 pounds) in intervention participants and differences were sustained for the remainder of the year. This partnership enabled a success in achieving weight loss comparable to the DPP study; moreover, this partnership helped lower the cost of a diabetes-prevention service (reduced overall personnel costs by 50%) and may also provide a model for health-plan reimbursement (Ackermann, Finch, Brizendine, Zhou, & Marrero, 2008). These findings also support the need to test additional means of translating the DPP in a cost-effective and sustainable manner in order to target a greater number of pre-diabetic individuals.

As indicated by the Centers for Disease Control and Prevention, from 2007 to 2009, the prevalence of type 2 diabetes is almost twice as high in Hispanics compared to non-Hispanic whites (CDC, 2011). In addition, the incidence of adults who are
overweight or obese is higher among Hispanics compared to non-Hispanic whites further increasing their prevalence of type 2 diabetes (Flegal, Carroll, Kit, & Ogden, 2012). Although genetics play a significant role in the occurrence of type 2 diabetes in Hispanics (in combination with cultural and environmental factors), those in low-income communities also have an increased risk due to lack of health insurance (Cusi & Ocampo, 2011).

Ockene and colleagues (2012) recognized this phenomenon and attempted a community-based, culturally tailored, literacy-sensitive lifestyle intervention and hypothesized weight loss and reducing the risk of type 2 diabetes among low-income prediabetic Hispanics. A first-year cost per participant was $661 included 3 individual and 13 group sessions over a 12-month period. The Lawrence Latino Diabetes Prevention Project (LLDPP) modified the DPP lifestyle intervention curriculum in order to identify and fill knowledge gaps, attitudes toward diabetes prevention and challenges to lifestyle change for weight loss (Ockene et al., 2012). Combined with advised dietary changes, participants were recommended (yet not supervised) to increase their physical activity by increasing their walking by 4000 steps per day. Unfortunately the 162 participants involved with the lifestyle intervention only saw a weight loss of -2.5 pounds as compared to the DPP weight loss of -12.3 pounds; attendance of the group sessions was low and non-indicative of program success. Although the LLDPP was unable to achieve a meaningful improvement in physical activity and weight loss, it had been noted that developing a lifestyle intervention in a culturally tailored manner, sensitive to their economic situation, increases program ownership and trust (Millard et al., 2010).
Large randomized trials, like that of the Da Qing IGT and Diabetes Study, the Finnish Diabetes Prevention Study and DPP, have demonstrated the effectiveness of lifestyle interventions achieving modest weight loss in overweight pre-diabetic adults can significantly delay the onset of diabetes. Unfortunately, these trials used an expensive efficacy-based methodology making it difficult to effectively translate to a sustainable model in high-risk low-income community members (Ockene et al., 2012). Although attempts have been made to deliver a more cost-effective diabetes prevention program, especially among those with greater risk-factors, there are still no existing models for delivering such an intervention to a large growing population of American adults with pre-diabetes (Ackermann et al., 2008).

Combining a currently running exercise program, titled 100 Citizens, with a free DPP model might provide a solution to the diabetic issue. Administered in Recreation Park, San Fernando, CA, this group-based exercise program is planned, coordinated and implemented by Cal State University Northridge Kinesiology students at no-cost to the participants. The program engages the participants beyond the CDC recommended 150 weekly minutes of moderate intensity exercise and is capable of being modified to account for different fitness levels. Helping target the obesity epidemic, participants are trained in a progressive fashion to improve muscular endurance and strength, cardiovascular endurance, flexibility and body composition. Successful 100 Citizens pilot programs, implemented in other communities, have helped demonstrate the feasibility of targeting high-risk individuals. This study was conducted to test the hypothesis that a free 12-week community-based diabetes prevention program including supervised exercise, conducted in Recreation Park, San Fernando, CA by Kinesiology students, can
successfully yield a 5%-7% weight loss in high-risk adults delaying the onset of type 2 diabetes.
CHAPTER III

Research Design and Methods

Research Design

This was a 1-group pretest-midtest-posttest longitudinal study design specifically selected to evaluate the effectiveness of a free community-based diabetes prevention program delivered by undergraduate Kinesiology students. This study design does not contain a comparison group; rather, one group is utilized, in which all qualified participants receive the intervention and participants serve as their own control. Participants were evaluated for their total percent weight loss, muscular endurance, cardiovascular endurance, flexibility, knowledge improvement, and program attendance.

Research Team

A research team, inclusive of a graduate student researcher, undergraduate interns and a faculty advisor, implemented the research study. With the aid of the faculty advisor, the undergraduate interns (assistant instructors) were selected by the graduate student researcher. The graduate student researcher met with the assistant instructors and conducted training sessions to inform them of research program design, screening and fitness testing protocols, and group-exercise instruction.

Participants

The inclusionary criteria required that participants be between the ages of 18-80 years of age and have a body mass index (BMI) greater than or equal to 30 kg/m² (obese). Participants were also required to be considered prediabetic which was defined as scoring a five or greater on the National Diabetes Education Program (NDEP) Diabetes Risk Test which can be retrieved at
The exclusionary criteria for participants included the following:

- Answering ‘yes’ on any of the questions on a modified version of the Physical Activity Readiness Questionnaire (PAR-Q) form (see Appendices A and B). Participation was granted if approval by a physician was provided.
- Were pregnant, or expected to be pregnant during the program.
- Were unable to walk a quarter mile.
- Were taking a medication or having a medical condition that interfered with the assessment of diabetes risk.
- Had an unstable body mass (defined as having gained or lost seven pounds within three months before the start of the program).

A 1-page flier was distributed in San Fernando Recreation Park, California inviting community members (see Appendices C and D). Those who were interested were first required to attend the screening session where eligibility was determined utilizing the inclusionary and exclusionary criteria. Each qualified participant was given an informed consent form, which had been approved by the Institutional Review Board at California State University, Northridge (see Appendices E and F). The form described the purpose, procedures, potential risks, possible benefits, and notice of confidentiality. Once the program was thoroughly explained, all participants gave written consent.

Twenty-nine participants volunteered to partake in the program at Recreation Park in San Fernando, California. Although there were strict guidelines required to identify qualified participants for the purposes of data collection, interested community members
(without contraindications) were also allowed to participate in the program and while data was collected, they were not included in any data analyses. It was decided that turning away those in need of a free community-based diabetes prevention program would be a disservice to the participant and community.

**Measures**

The independent variables of this study consisted of an exercise program inclusive of the following components: (1) resistance training, (2) moderate intensity aerobic training, and (3) health education and dietary lessons modified from the national DPP curriculum. The dependent variable was percent weight loss.

**Procedure**

This group-based program utilized a model similar to the publicly available DPP materials with modifications to provide for the sustainability of the program delivery by undergraduate Kinesiology students. The DPP clinical trial curriculum can be retrieved at http://www.cdc.gov/diabetes/prevention/recognition/curriculum.htm.

Two weeks prior to the start of the program, interested community members were invited to attend one of the two screening sessions. Those who attended were given a thorough explanation of the program details inclusive of the purpose, testing protocols, format and duration. Once participants acknowledged the program description, they signed an institution approved consent form and bill of rights form. The participants had their height and weight measured with clothing on but shoes off in a private room and body mass index was calculated. Participants were asked to complete the NDEP Diabetes Risk Test. With a confirmed BMI of 30 kg/m² or greater and a Diabetes Risk Test of 5 or greater, participants were asked to complete a modified PAR-Q. Participant blood
pressure was also measured. If the participant answered 'yes' to any of the questions on the PAR-Q, or measured a blood pressure exceeding 140/90, they were asked to receive written clearance from a physician prior to program participation.

Qualified participants were invited back to attend one of two orientation days. After a brief explanation, participants were asked to complete the following baseline tests and measurements:

- Height, weight, and waist circumference in a private room.
- Flexibility via the YMCA Sit and Reach test (Kaminsky, 2010).
- Muscular endurance via the Push-up test (Kaminsky, 2010).
- Cardiovascular endurance via the YMCA step test (Neiman, 2011).
- Complete a 50 question multiple choice knowledge assessment test (created by the graduate student researcher based on the DPP core curriculum).

Upon completion, participants were given both food-and-activity trackers and a DPP Fat-and-Calorie-Counter (in either English or Spanish) along with a concise lesson on how to use both documents.

Participants were instructed to meet the following week outside the gymnasium of San Fernando Recreation Park. The program consisted of three individual hour long sessions, each week, for 12 weeks. Each week totaled 150 minutes of physical activity (with a maximum of 75 minutes of resistance training) and 30 minutes of health education classes. Each session encompassed 50 minutes of structured moderate-intensity exercise delivered in a circuit-training style intended to maintain an elevated heart rate and exercise intensity incorporating both aerobic and resistance training. Lead by the assistant instructors, each session began with a dynamic warm-up. Participants were then
evenly divided into one of three stations (upper body, lower body, or core). Utilizing resistance bands and body weight exercises, a total of 5-10 exercises were used that targeted major muscle groups. Participants were given appropriate exercise progressions and modifications when required which accommodated their fitness capacity. Participants also performed moderate-intensity aerobic exercise similar to brisk walking (4 mph/15 min mile) (ACSM & ADA, 2010). Each day the exercise component ended with a cool-down consisting of static stretches progressing through the major muscle groups. Participants were also encouraged to include an additional 30 minutes of brisk walking per day in combination with the 150 minutes of physical activity performed during the program.

A health education session was conducted following the exercise component. Sessions were based on the DPP core education curriculum (http://www.cdc.gov/diabetes/prevention/pdf/handouts.pdf) and were modified to fit the 12-week completion period. Condensed into ten minute sessions, a verbal discussion (in both Spanish and English) was lead by the graduate student researcher and an assistant instructor. Topics included basic nutritional recommendations, physical activity approaches and behavioral self-management strategies. The following was the weekly breakdown of the health education lessons:

- Week 1: Program Introduction
- Week 2: Be a Fat and Calorie Detective & Reducing Fat and Calories
- Week 3: Healthy Eating & Tip the Calorie Balance
- Week 4: Move Those Muscles & Being Active: A Way of Life
- Week 5: Take Charge of What's Around You
• Week 6: Problem Solving
• Week 7: Four Keys to Healthy Eating Out
• Week 8: Talk Back to Negative Thoughts
• Week 9: The Slippery Slope of Lifestyle Change & You Can Manage Stress
• Week 10: Jump Start Your Activity
• Week 11: Make Social Cues Work
• Week 12: Ways to Stay Motivated

In order to maintain reasonable fidelity to the DPP model, participants were also instructed to monitor their daily physical activity, calorie intake and fat intake through the use of the DPP Fat-and-Calorie-Counter and food-and-activity trackers (provided each week). Along with proper food scaling, participants were taught how to record their daily physical activity, daily calorie and fat intake. Participants were asked to limit their calorie and fat intake, utilizing the following guidelines, 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)

Food and activity trackers were reviewed by the lead graduate researcher each week and pertinent feedback was provided. The pace of weight loss was targeted for each participant at 1-2 pounds per week.

Each week participants were weighed in a private room to assist in maintaining a 1-2 pound weight loss per week. Both mid (Week 18) and post (Week 36) testing consisted of the same testing protocol (with the exception of the informed consent form,
Bill of Rights, NDEP Diabetes Risk Test, and Modified PAR-Q) which participants had completed during the screening and orientation sessions.

**Statistical Analysis**

Utilizing a sign-in sheet, participant attendance was recorded and measured as a percentage of the 35 scheduled sessions (one session was canceled because it occurred on a holiday). The pretest-midtest-posttest assessment data were analyzed using a repeated measures ANOVA. Statistical significance was tested between trials and was determined significant at p<0.05.
CHAPTER IV

Results

Participants

At baseline, the sample size consisted of 24 females and 5 males with a mean age of 51.9 (SD ± 12.3). The ethnic and racial self-identifications were as follows: one (3.4%) participant self-identified as African American and twenty-eight (96.6%) self-identified as Hispanic. The racial and ethnic demographics of these participants correspond to the racial and ethnic demographics of the City of San Fernando where, as of 2010, 92.5% of San Fernando Citizens were self-reported as Hispanic (US Census Bureau, 2013). Table 1 presents characteristics that determined qualifications for inclusion of the interested participants who screened for the study on the pre-test date. Because a sample of convenience was used, generalizations to populations should be made with caution.

Table 1. Demographic Characteristics of the Participants

<table>
<thead>
<tr>
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<th>Number</th>
<th>Percent</th>
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<tbody>
<tr>
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<td>4</td>
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<tr>
<td>40-50</td>
<td>9</td>
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<tr>
<td>51-61</td>
<td>7</td>
<td>24.1</td>
</tr>
<tr>
<td>62-80</td>
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<td>27.6</td>
</tr>
<tr>
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<td></td>
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<tr>
<td>25.0 – 29.99 (overweight)</td>
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<td>31.0</td>
</tr>
<tr>
<td>30.0 or greater (obese)</td>
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<td>NDEP Risk Test Score</td>
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<td>Under 5</td>
<td>11</td>
<td>38.0</td>
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<tr>
<td>5 or greater</td>
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</tr>
</tbody>
</table>
Program Adherence

The study was 12 consecutive weeks with a total of 36 possible sessions. Due to a
government holiday, one session was cancelled resulting in 35 documented sessions.
Participant attendance was recorded each day and 76% or 22 of the 29 original registrants
participated in at least one session thus, seven who did not participate were omitted from
statistical analysis. The remaining 22 participants attended an average of 58.6% (SD ±
35%) of the 35 sessions. Ten participants were eliminated from data analysis because
they did not satisfy the inclusionary criteria of being considered “prediabetic” or “obese”
but were allowed to participate as a community service. Another 6 participants were
eliminated from data analysis because they did not satisfy the 75% attendance
requirement (missing more than 9 sessions) by the end of the 12-week study. At the
completion of the program, there were 6 qualified participants who were considered for
statistical analysis. Figure 1 below displays the attendance rate (out of 35 possible
sessions) for each qualified participant. Thus, the 6 qualified participants attended an
average of 86% (SD ± 9%) of the 35 sessions over the course of the program.
Percent Weight Lost

At the completion of the 12-week intervention, an average of 5.1% (SD ± 3.4%) of total weight was lost by the participants six participants with a range of 1.7% - 9.6% (Figure 2). Fifty percent of the participants achieved the weight loss goal of 5% (or greater). Figure 2 below displays the percent weight loss for each participant at the completion of the 12-week program.
The mean knowledge assessment test scores were as follows: Pre- ($\bar{x} = 24.5$, SD ± 5.0), mid- ($\bar{x} = 27.0$, SD ± 8.3), and post-test ($\bar{x} = 26.3$, SD ± 7.8). A repeated measures ANOVA with a Greenhouse-Geisser correction determined that mean test scores did not differ statistically significant between testing periods ($F(1.067,5.334) = 1.049, p > .05$). Therefore, we conclude that between pre-, mid-, and post-testing, no significant increase was observed in knowledge test scores and participants as a whole did not improve their understanding of basic nutritional strategies, physical activity guidelines, and behavioral self-management tactics. Figure 3 below displays the mean knowledge test scores (out of 50 points) for pre-, mid-, and post-test dates. The average test score maintained a range of 24 - 27 out of a total 50 points (a score of 49% - 54% or ‘F’ letter grade) over the course of the program.
Waist Circumference

The measured waist circumference just above the hip bones, helps assess abdominal fat, obesity levels and associated health risks. Obesity is defined as having a waist circumference of 35 inches for females and 40 inches for males (Kaminsky, 2010). The mean waist circumference measurements in inches were as follows: Pre- ($\bar{x} = 43.2$, SD ± 3.7), mid- ($\bar{x} = 41.5$, SD ± 4.2), and post-test ($\bar{x} = 40.2$, SD ± 4.3). A repeated measures ANOVA with a Greenhouse-Geisser correction determined that mean waist circumference measurements differed statistically significantly between testing periods ($F(1.570, 7.851) = 11.415, p < .05$). Post hoc tests using the Bonferroni correction revealed that waist circumference measurements at post-testing were significantly lower than at pre-testing. Therefore, we conclude that between pre- and post-testing, a significant reduction is observed in abdominal fat as evaluated by waist circumference.
Although waist circumference measurements were lower from pre- to mid-testing, differences were not statistically significant. Figure 4 below displays the mean waist circumference values (in inches) for pre-, mid-, and post-testing. The trend displays the average waist circumference decreased from 43.2 inches to 40.2 inches over the course of the program. Figure 5 below displays the waist circumference values (in inches) for pre-, mid-, and post-testing.

![Figure 4](image_url)

**Figure 4.** Mean waist circumference values (inches) for pre-, mid-, and post-test dates. Pre- (\(\bar{x} = 43.2, \text{ SD } \pm 3.7\)), mid- (\(\bar{x} = 41.5, \text{ SD } \pm 4.2\)), and post-test (\(\bar{x} = 40.2, \text{ SD } \pm 4.3\)) results. *Significant difference from pre to post (\(p < 0.05\)).
Field Tests

The YMCA Sit-and-Reach test, the YMCA Step Test and Push-up Test were administered on the scheduled pre-, mid-, and post-testing dates. The 3-minute YMCA Step Test estimates cardiovascular fitness based on how quickly the heart rate recovers (utilizing an age-adjusted standard) following a short bout of exercise. Unfortunately none of the participants were able to properly perform the YMCA Step Test at the appropriate cadence and time interval for the pre- and mid-testing. Four of the 6 participants were able to perform the YMCA Step Test on the post-testing date but insufficient data prevented any further statistical analysis.

The mean Push-up Test scores were as follows: Pre- ($\bar{x} = 10.8$, SD $\pm 9.2$, mid- ($\bar{x} = 6.5$, SD $\pm 4.9$), and post-test ($\bar{x} = 11.0$, SD $\pm 9.1$). A repeated measures ANOVA with a Greenhouse-Geisser correction determined that mean test scores for the Push-up Test did not differ statistically significant between testing periods ($F(1.858, 9.288) = 1.624, p$.

---

*Figure 5.* Waist circumference measurements for each participant evaluated at pre-, mid-, and post-test dates.
Push-ups showed no statistical significance despite the changes in repetitions performed. Figure 6 below displays the mean Push-up Test scores at pre-, mid- and post-testing periods.

![Figure 6. Mean Push-up test values for pre-, mid-, post-test dates. Pre- (\( \bar{x} = 10.8, SD \pm 9.2 \)), mid- (\( \bar{x} = 6.5, SD \pm 4.9 \)), and post-test (\( \bar{x} = 11.0, SD \pm 9.1 \)) results. There was no significant difference between test dates (\( p > 0.05 \)).](image)

3.2), mid- (\( \bar{x} = 12.6, SD \pm 3.0 \)), and post-test (\( \bar{x} = 14.5, SD \pm 3.6 \)). A repeated measures ANOVA with a Greenhouse-Geisser correction determined that mean test scores for flexibility, via the YMCA Sit-and-Reach test, differed statistically significantly between testing periods (\( F(1.354, 6.770) = 9.858, p < .05 \)). Post hoc tests using the Bonferroni correction revealed that flexibility was significantly higher at post-testing than at pre- and mid-testing. Figure 7 below shows the mean Sit-and-Reach test scores in inches at pre-, mid- and post-testing periods.
Figure 7. Mean Sit-and-Reach values (inches) for pre-, mid-, post-test dates. Pre- (̅x = 10.3, SD ± 3.2), mid- (̅x = 12.6, SD ± 3.0), and post-test (̅x = 14.5, SD ± 3.6) results.

* Significant difference from pre to post and mid to post (p < 0.05).
CHAPTER V

Discussion

The prevalence of obesity and diabetes is a growing public health concern and identifying a feasible solution must be a priority. Of those suffering from type 2 diabetes, the Hispanic population is one of growing concern since 11.8% of all Hispanics suffer from diabetes and 31.6% of Hispanics in Los Angeles County are classified as obese (Los Angeles Department of Public Health, 2012; CDC, 2011). These staggering numbers coupled with increasing obesity and type 2 diabetes trends indicate the need to implement a practical and sustainable solution. Research has indicated that lifestyle interventions (inclusive of structured exercise, moderate weight loss and health education classes) are viable solutions and are key in preventing or delaying the onset of diabetes (ACSM & ADA, 2010; CDC, 2011; DPP Research Group, 2002). Creating a free individually tailored community-based diabetes prevention program delivered by Kinesiology educated university students, utilizing an adapted DPP curriculum, could provide pre-diabetic individuals with the tools necessary to achieve moderate weight loss thus decreasing the incidence of developing type 2 diabetes. Therefore, the primary purpose of this study was to determine whether a free 12-week modified diabetes prevention program (the 100 Citizens Kinesiology program free community exercise model combined with the adapted DPP curriculum) can successfully yield a 5% - 7% weight loss in participating pre-diabetic adults, in turn reducing or delaying the onset of type 2 diabetes.

The 100 Citizens program is a group-based exercise program that is planned, coordinated and implemented in Recreation Park, San Fernando, California by Cal State
Northridge University Kinesiology students. With a primary purpose of targeting the obesity epidemic, Kinesiology students can instruct exercises with suitable progressions and modifications that best suit the fitness levels of the participants. With extensive knowledge in the science of human movement, these students train participants in a progressive manner to help improve cardiovascular endurance, muscular endurance and strength, flexibility and body composition. Successful 100 Citizens pilot programs, implemented in other communities have helped demonstrate the feasibility of targeting high-risk individuals with the added advantage of being free to participants. By combining the 100 Citizens exercise model and the DPP curriculum; pre-diabetic participants were provided the free tools, resources and social support in order to successfully reduce their risk for type 2 diabetes.

During this study, participants were assessed for their total percent weight loss, muscular endurance, cardiovascular endurance, flexibility, diabetes education retention and individual program attendance. The objective of this study was to provide participants with 150 weekly minutes of structured moderate-intensity exercise and health and nutrition education in order to lose 5% - 7% total body weight. As supported by the DPP clinical trial, 150 minutes of weekly structured exercise and weight loss were chosen because of its feasibility and effectiveness for long-term maintenance of diabetes prevention (DPP Research Group, 2002). Weight loss was the predominate predictor of a lower incidence of type 2 diabetes but it also seems physical activity plays a role in preventing type 2 diabetes across ethnic groups and in both sexes (ACSM & ADA, 2010). Therefore, the primary consideration for determining success of this program was
the percent weight loss and participation in structured physical activity (determined via the 75% attendance rate requirement).

Of the 29 original enrolled, 7 failed to attend at least one session resulting in an immediate 24% dropout rate. Findings were consistent with previous studies where low session attendance and high dropout rates to lifestyle interventions was found in tested populations of low socioeconomic, urban or Hispanic populations (Feathers, Kieffer, & Palmisano, 2007; Ockene et al., 2012; Seidel, Powell, Zgibor, Siminerio,& Piatt, 2008). Further evidence of the challenge of maintaining interested participants was the number remaining when implementing the requirement of 75% attendance. A total of 6 participants qualified for further data analyses with an average attendance rate of 86%. Because of the challenges of retaining participants who are engaged in a lifestyle intervention, it becomes imperative for students staffing the program to authentically engage the participants and establish a meaningful and caring relationship to encourage their attendance. Students must realize that participants don’t “have” to be there and part of a successful program is creating a caring community amongst the participants themselves and the student staff.

This modified diabetes prevention program led to significant weight loss in 50% of the participants of this study who met the program attendance requirements. Obviously, the sample size is small but the 50% success rate is comparable to other diabetes prevention programs modified from the original DPP (Ackermann et al., 2008; Jackson, 2009; Kramer, McWilliams, Chen, & Siminerio, 2011; Ockene et al., 2012; Piatt, Seidel, Chen, Powell, & Zgibor, 2012). What is important to recognize is the successful 5% weight loss goal was accomplished in a 12 week period whereas the
original DPP had their 50% of the 1,079 qualified participants achieve the 7% weight loss goal in 24 weeks (DPP Research Group, 2002). Again, the author recognizes the reality of sample size comparisons but the current work suggests the possibility exists and greater efforts must be made to recruit larger sample sizes and determine efficacy.

Although the health education classes (modified and condensed to fit the 10 minute sessions) were offered in both English and Spanish, the participants were unable to show significant retention of the diabetes education information. This may be related to only 50% of the participants achieving their weight reduction goal but still, the retention was similarly poor across all participants. A few possible explanations indicating why test scores were unsatisfactory include the following:

1. The original DPP Research Group (2000) presented the health education material within 16 sessions ranging from 30 minutes to an hour each whereas this study presented the same material within 35 sessions at 10 minutes each. Although the presented material was modified to fit each 10 minute discussion-style based lesson (resulting in less time spent as compared to the original DPP curriculum), content from the preexisting curriculum was not omitted. Given the knowledge base of the research team, the exercise component may have been stressed more importantly than the health education material as denoted by the time spent discussing the health education material in comparison to the exercise sessions.

2. The knowledge assessment test was poorly developed and translated resulting in confusion of exam questions.
3. The health education classes were held outside in the park. The noisy and perhaps distracting environment may not have been conducive to knowledge acquisition and retention.

4. Participants did not possess or practice the appropriate study strategies.

5. Students were not effective in delivering the information. It was observed in the original DPP that the lifestyle coaches who delivered the health education curriculum were extensively trained to deliver the material (DPP Research Group, 2002). Although the assistant instructors were trained prior to delivery of this program, additional training sessions inclusive of role playing, reflective listening and empowerment strategies should occur prior to future programming which may require a longer period of education delivery.

Participants waist circumference measurements were measured suggesting a reduction of abdominal fat associated with the loss in inches. Those who lost total body weight in theory also lost inches of abdominal fat which would decrease their risk for associated health complications. Results in the reduction of mean waist circumference measurements were comparable to other diabetes prevention programs modified from the original DPP (Kramer, McWilliams, Chen, & Siminerio, 2011; Piatt, Seidel, Chen, Powell, & Zgibor, 2012).

Although it was the intent for the graduate researcher to analyze the participant’s cardiovascular endurance, low fitness levels and pre-existing complications (i.e. knee, shoulder, back injuries and prior surgeries) made the YMCA Step Test an unsuitable testing method. The previous sedentary lifestyles of some of the participants along with their obese classification and previous injuries made it difficult to complete this field test
at the proper cadence and time interval. Additionally, it was noted some participants were able to complete the YMCA Step Test during the post-test day but palpating heart rates posed a challenge for the undergraduate Kinesiology students. It is suggested that the Cooper 12-Minute Run/Walk test (Cooper, 1968) be utilized instead of the YMCA Step Test for future testing assessments. The Cooper 12-Minute Run/Walk test allows the participant to walk and/or run at the own pace for 12 minutes and eliminates the variability associated with maintaining a cadence in addition to eliminating the need to palpate for heart rate. This work underscored the need for students to receive better training and opportunity to validate their palpating abilities with validated heart rate monitors.

Muscular endurance fitness testing via the Push-up Test also posed a problem for many of the participants. Many reported prior shoulder injuries and surgeries minimizing their ability to execute the necessary form. It is recommended a modified Push-up Test utilizing a bench or tabletop be created for future endurance fitness testing. Although this is not a normative test, this type of test may help minimize joint strain while still assessing participant fitness gains. This pilot work underscores for Kinesiology majors the level of fitness one should expect in the community which is often compounded by pre-existing injuries. It should also underscore the necessity for accessible programs to be developed as the need is definitely present.

**Strengths of the Current Study**

There were several strengths of this study. First was the participatory nature of the health and nutrition education classes which were held at the conclusion of each day’s exercise session. Participants engaged in a 10 minute session where lessons encompassed
topics on improving dietary intake, ways to incorporate exercise fundamentals, problem solving strategies and tactics to stay motivated all of which are included in the following link: http://www.cdc.gov/diabetes/prevention/recognition/curriculum.htm. It had been noted that participatory classes were more attractive when condensed into shorter lectures (Millard et al., 2010). These discussion-style based lessons helped participants share personal strategies and possibly encourage stronger interpersonal relationships amongst participants, assistant instructors and the graduate student researcher.

Second, offering the program in both English and Spanish helped include interested mono-lingual participants. Developing a lifestyle intervention in a culturally tailored manner, sensitive to possible language barriers, increases program ownership and trust (Millard et al., 2010). Participants were given the opportunity to learn pertinent material by minimizing the possibility of language barriers interfering with the learning process.

Third, while preventing or delaying the onset of type 2 diabetes for even a short period of time is beneficial to individuals, it is most beneficial to society to prevent or delay diabetes as long as possible. Although this community based diabetes prevention program had comparable results to the original DPP (if one were to project it as being a successful model), two distinct advantages are 1) the length of the program was much shorter (i.e. 3 months vs. 6 months) and 2) it was free of cost. Most programs are longer in duration and are supported by funding or require a program fee to be paid.

Fourth, the program is replicable in other underserved communities where the need is greatest. The 100 Citizens DPP, implemented by Kinesiology students, can be modified to account for different fitness levels through relevant exercise progressions and
modifications. This type of programming is expandable helping create different types of
exercise programs (dependent on the demand from the community members). Additional
programs can be offered, at no cost and can lead to participants enrolling for fee service
exercise classes which creates additional revenue for the parks. This type of
programming can offer five potential wins (positive outcomes) for those participating:

1. The participants benefit from these programs because they become healthier and
develop a better understanding of physical activity, overall health and well-being.

2. The Kinesiology students experience hands-on educational opportunities
including, but not limited to, applying classroom knowledge in a real-world
setting, practicing interpersonal skills, observing networking opportunities and
developing creative exercise sessions.

3. The parks resources are utilized and are established as an integral part of
community health and wellness promotion.

4. The community as a whole gains healthier community members who serve as role
models for their families and others.

5. Finally, Kinesiology as a profession gains recognition in the public health arena
which can lead to a much needed job creation potential. The greater the
programming of physical activity in the community, the more imperative it
becomes for public health to employ those with physical activity/exercise
education to oversee public programming of exercise opportunities.

**Limitations**

There were several limitations to this study. First was the sample size of this
study (N = 6) and as a result, poor statistical power. Future studies with larger sample
sizes will give a better analysis of the viability of a student driven diabetes prevention program. Although this pilot study led to a larger program in San Fernando in the following semester, additional marketing methods and public health support to increase participation in future studies and programming are needed.

Second, all of the participants of this study were volunteers able to attend the morning sessions. This inherently introduced volunteer bias, as only those available in the morning could participate. This may have also contributed to the small sample size of this study. Having the ability to offer classes in the morning and evening would increase community outreach. However, this requires Kinesiology departments to recognize their place in improving the public’s health and encourage programming and scheduling of classes appropriately.

Third, this study did not include a control group but rather utilized a non-randomized 1-group pretest-midtest-posttest study design. The program was conducted in a predominately non-diverse Hispanic population and the results may not be generalizable to other populations. However, given the high rates of diabetes in this population, the limitation is of small consequence.

Fourth, many DPP programs use the HbA1c blood test which provides an average blood sugar level over a six to 12 week period. This blood test is more accurate in measuring a person's diabetic condition, however since feasibility and sustainability were intentions of this program, this costly blood test was excluded.

**Implications**

The results of this 12-week modified diabetes prevention program, implemented in San Fernando Recreation Park, demonstrated that Kinesiology students are capable of
helping pre-diabetic individuals successfully yield a 5% - 7% weight loss goal. These findings lead to an established final protocol for an awarded Kaiser Permanente Community Benefits Grant targeted to implement a larger DPP in San Fernando with the potential to expand statewide within other communities through the Cal State University system. The larger DPP in San Fernando has recently ended and results will soon be available.

Finding a feasible and sustainable solution to the diabetic issue could potentially save billions of dollars in health care costs. Diabetes cost the country an estimated $206 billion in 2011. If current trends continue, more than half of Americans will have diabetes or be considered prediabetic at an annual cost of $512 billion by 2021 (United Health Group, 2012). By utilizing DPP programs, like that of 100 Citizens DPP, the potential to save billions of dollars in healthcare and improve the quality of life for thousands increases dramatically.

**Directions for Future Research**

Additional methods to increase knowledge acquisition should be implemented in future studies. The knowledge assessment test (in both English and Spanish) should be developed over an extensive period of time testing question formatting, sentence structure and overall difficulty. If possible, classes should be held in a quiet environment in order to improve the delivery and comprehension of important information. Additionally, teaching the participants appropriate study strategies (while emphasizing the importance of knowledge retention) as well as practical application of the knowledge gained could possibly improve the participant’s ability to retain pertinent information.
Collecting the food-and-activity trackers posed a challenge and will likely continue in future studies. This is particularly important since it was previously indicated that the self-monitoring process was one of the most important strategies for significantly changing diet and exercise behaviors (DPP Research Group, 2002). Rather than require the participants to fill out their food-and-activity trackers for the extent of the 12 weeks, the food-and-activity trackers should be used as an additional tool to augment the weight loss goal. Strategies must be developed to better integrate this information into their lifestyles including greater problem solving discussions with the participants themselves.

Although the health education sessions offered basic nutritional recommendations inclusive of fat and calorie detection with healthy eating tips, the curriculum did not offer many recipes. It was noted that Hispanics involved in diabetes education classes accepted diet as an important strategy to preventing or delaying the onset of diabetes. Although participants made dietary changes, their diets still reflected the characteristics of the traditional Hispanic diet that is high in fats and carbohydrates (Jezewski & Poss, 2002). Providing weekly recipes could provide participants healthy substitutes so that they can properly adjust their habits and reach their goals.

This 12-week modified diabetes prevention program developed and implemented by Kinesiology students, for a target prediabetic Hispanic population, produced weight loss in participating adults while providing 150 weekly minutes of structured exercise. Implementation of this intervention at similar community settings and populations has the potential to bring about important health benefits but there must be continued development of strategies specific to the communities being served.
References


Appendix A

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>
<td></td>
<td></td>
</tr>
<tr>
<td>Do you frequently have pains in your chest when you perform physical activity?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Have you had chest pain when you were not doing physical activity?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Have you had a stroke?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Do you lose your balance due to dizziness or do you ever lose consciousness?</td>
<td></td>
<td></td>
</tr>
<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>
<td></td>
<td></td>
</tr>
<tr>
<td>Are you pregnant now or have given birth within the last 6 months?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Do you have asthma or exercise induced asthma?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Do you have low blood sugar levels (hypoglycemia)?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Do you have diabetes?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Have you had recent surgery?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

________________________________________________________________________

________________________________________________________________________

Do you take any medication, 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 B

La actividad física regular es divertida y saludable. Cada día un número mayor de personas comienzan a ser más activos. Para la mayoría de las personas, no hay riesgos para ser más activos. Sin embargo, hay personas que deberían consultar con su médico antes de llegar a ser más activo físicamente.

Por favor, complete este formulario cuidadosamente y con la mayor precisión.

Formulario Par-Q

Por favor, marque SI o NO a las siguientes preguntas:

<table>
<thead>
<tr>
<th>Sí</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>¿Alguna vez le ha dicho su médico que tiene un problema cardiaco y que solo debe hacer actividades físicas recomendadas por un médico?</td>
<td></td>
</tr>
<tr>
<td>¿Tiene dolor en el pecho cuando hace alguna actividad física?</td>
<td></td>
</tr>
<tr>
<td>¿Ha tenido dolor en el pecho cuando usted no está realizando una actividad física?</td>
<td></td>
</tr>
<tr>
<td>¿Ha tenido un accidente cerebrovascular (derrame cerebral)?</td>
<td></td>
</tr>
<tr>
<td>¿Pierde el equilibrio debido a mareos, o ha perdido alguna vez el conocimiento?</td>
<td></td>
</tr>
<tr>
<td>¿Tiene un problema de los huesos, coyunturas o algún otro problema de salud que le causa dolor y limitaciones que deben considerarse a la hora de establecer un programa de ejercicio (ej. el diabetes, osteoporosis, alta presión arterial, colesterol alto, la artritis, anorexia, bulimia, anemia, epilepsia, problemas respiratorios, problemas de la espalda, etc.)?</td>
<td></td>
</tr>
<tr>
<td>¿Está embarazada o ha dado a luz en los últimos 6 meses?</td>
<td></td>
</tr>
<tr>
<td>¿Tiene asma o asma inducida por ejercicio?</td>
<td></td>
</tr>
<tr>
<td>¿Está tomando medicamentos recetados por el médico para la presión arterial o para el corazón (por ejemplo, pastillas diuréticas)?</td>
<td></td>
</tr>
<tr>
<td>¿Tiene baja los niveles de azúcar en la sangre la (hipoglucemia)?</td>
<td></td>
</tr>
<tr>
<td>¿Tiene diabetes?</td>
<td></td>
</tr>
<tr>
<td>¿Ha tenido una cirugía recientemente?</td>
<td></td>
</tr>
</tbody>
</table>

Si ha respondido SÍ a cualquiera de las preguntas, por favor elabore:
¿Toma usted algún medicamento, ya sea con receta o sin receta médica, regularmente?

Si/ No

¿Para qué es el medicamento? ______________________________________________________

____________________________________________________

¿Cómo afecta el medicamento en su capacidad para hacer ejercicio o lograr sus metas de aptitud física?

____________________________________________________________________

________________________________________________________________________

Por favor, tenga en cuenta que: Si su salud cambia de modo que usted podría entonces responder "SÍ" a cualquiera de las preguntas previas, dígale a su entrenador. Pregunte si usted debería cambiar su plan de actividad física.

He leído, comprendido y he completado el cuestionario. Todas las preguntas que tenía se me han sido contestadas a mi total satisfacción.

Nombre: ____________________________
Firma: ____________________________
Fecha: ____________________________
Appendix C

Diabetes Prevention Program

Free 12-week exercise program
June 17th - September 6th
Mon, Wed, Fri 9:45am-10:45am

Adults 18-80 years of age
With BMI* greater than 30 (* see chart in back)

SCREENING (MANDATORY)
June 7th or 10th 10:30am-12:30am

ORIENTATION (MANDATORY)
June 12th or 14th 10:30am-12:30am

Goal Objective
5-7% Weight loss

FOR MORE INFORMATION CONTACT
Davey Ramos (661) 350-3005
Liane E. Fujita-Ahmed (805) 750-1477

Location
Recreation Park
208 Park Ave, San Fernando, CA
Programa de Prevención de la Diabetes

Gratis programa de ejercicios de 12 semanas
Junio 17th -Septiembre 6th
Lunes, Miércoles, Viernes 9:45am-10:45am

Adultos 18-80 años de edad
Con BMI* mayor que 30 (* ver tabla en la parte trasera)

PROYECCIÓN (IMPRESCINDIBLE)
Junio 7th or 10th 10:30am-12:30am

ORIENTACIÓN (IMPRESCINDIBLE)
Junio 12th or 14th 10:30am-12:30am

Gol Objetivo
5-7% de pérdida de peso

PARA OBTENER MÁS INFORMACIÓN
Davey Ramos (661) 350-3005
Liane E. Fujita-Ahmed (805) 750-1477

Ubicación
Recreation Park
208 Park Ave, San Fernando, CA
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:
Jamie Phillips
Kinesiology
(310) 625-4765
jamiephillips84@gmail.com

Davey Ramos
Kinesiology
(661) 350-3005
davey.ramos.171@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 30 kg/m² or greater and score of 5 or higher on the National Diabetes Education Program (NDEP) Diabetes Risk Test.

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 30 kg/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 140/90, 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 give you a food and activity tracker and you will be taught how to log your daily step count and log what you eat.
3. 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 30 minutes of walking 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 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 ________________________________
Appendix F

Universidad Estatal de California, Northridge
CONSENTIMIENTO PARA ACTUAR COMO PARTICIPANTE HUMANO DE INVESTIGACIÓN

Se le ha pedido a participar en un estudio de investigación. La participación en este estudio es completamente voluntario. Por favor, lea la siguiente información y antes de decidir si quiere participar formule cualquier pregunta acerca de información que usted no entiende. Un investigador enumerado estará a su disposición para responder preguntas.

EQUIPO DE INVESTIGACION

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¿Cuál es el propósito de este estudio?
El propósito de este estudio es para determinar si un programa gratis para la prevención de diabetes, que está basada en la comunidad, puede producir una pérdida 5-7% de peso en adultos que son pre-diabéticos.

¿Quién puede participar?
Usted está elegible para participar en este estudio si usted es un adulto entre la edad de 18-80 años con un BMI de 30 kg/m² o mayor y puntuación de 5 o superior en la prueba de riesgo de diabetes del Programa Nacional de Educación de Diabetes (NDEP).

Usted no es elegible para participar en este estudio si tiene uno(s) de los siguiente:

- Si marca “si” en el formulario PAR-Q
  - Puede concederse la participación en el estudio si es aprobada por un médico
- Si está embarazada o si espera estar embarazada
- Incapacidad para caminar 5 cuadras de la cuidad
- Tiene una presión arterial mayor de 140/90
  - Puede concederse la participación en el estudio si es aprobada por un médico
- Si ha aumentado o perdido 7 libras en los últimos 3 meses
- Si ya tiene diabetes

¿Cuánto de su tiempo se espera?
Este estudio incluirá aproximadamente 3 horas a la semana durante un período de 3 meses. Debido a la importancia de la coherencia en el ejercicio de este programa, le pedimos que se le pasa no más de 9 sesiones en total. Falta más de 9 sesiones le excluirá del programa.

¿Qué significa este estudio?
1. Después de que hayamos recibido su formulario de consentimiento firmado y una factura firmada de los derechos, mediremos su altura y peso con la ropa puesta menos los zapatos en una zona privada para calcular su BMI.
2. A continuación se le pedirá que complete el Examen de Riesgo de Diabetes NDEP.
3. En este momento si se confirma que su IMC es igual o superior a 30 kg / m² y su puntaje es un 5 o superior para la Prueba de Riesgo de Diabetes NDEP, le pedimos que complete un cuestionario de actividad física de preparación.
4. Si su respuesta es sí a cualquiera de las preguntas del Cuestionario de Actividad Física de Preparación, le pedimos que usted recibe el visto bueno de su médico para participar en el programa.
5. Por último, vamos a evaluar su presión arterial con un dispositivo que consiste en envolver un brazalete alrededor de su brazo. Si la lectura es de 140/90, hable con su médico antes de participar en nuestro programa.
6. Si cumple con todos los requisitos, le invitamos a unirse a nuestro programa.

Día de orientación
Será la semana antes de que comience el programa
1. Vamos a realizar pruebas de referencia y medidas (resistencia muscular, cardiovascular, resistencia, flexibilidad, índice de masa corporal, peso y circunferencia de la cintura). Estas pruebas incluyen:
   - Flexiones
   - YMCA Prueba de Paso
   - Prueba de Sentarse y Alcanzar
   - Mediciones de Altura y Peso
   - Perímetro de cintura de medición
2. Después de la porción actividad física, tendremos 10 minutos de temas de educación en salud que giran en torno a las pautas nutricionales básicas, estrategias de actividad física y de comportamiento habilidades de autocontrol. También vamos a educar a usted en relación con la ingestión dietética dándole las pautas para limitar su diario de grasa y calorías. Estas directrices se le dará a usted
como una ayuda para ayudarle a alcanzar su meta principal de perder 1-2 libras de peso por semana.
3. Le animamos a participen en un mínimo de 30 minutos de caminando por día, además de nuestras sesiones de actividades físicas.
4. Le pedimos que seguir la actividad de su ingesta calórica diaria y física en los seguidores que le ofrecemos. Nos aseguraremos de explicar con todo detalle cómo se puede hacer esto. También vamos a revisar sus revistas cada semana para dar información y consejos para ayudarle a alcanzar sus metas.
5. Mediremos su altura y peso con la ropa puesta menos los zapatos en una zona privada.

Mediados de Pruebas
Durante la sexta semana del programa tendremos una sesión ampliada para incluir el tiempo para volver a probar sus pruebas y mediciones de línea de base: fuerza, cardiovascular, resistencia, flexibilidad, índice de masa corporal, peso, circunferencia de la cintura, y la prueba de conocimientos de evaluación de la misma manera como la inicial pruebas durante día de orientación.

Prueba Después del Programa Finalizado
En la conclusión de las 12 semanas, los mismos ensayos y los pasos de prueba se producirá. A continuación, se recogen su diario y responder a cualquier pregunta que usted pueda tener acerca del programa.

¿Cuáles son los riesgos y molestias de este programa?
El riesgo para que usted participe en este programa es mínima. Los posibles riesgos y / o molestias que puede experimentar son el aburrimiento, fatiga, mareos, náuseas, ataques al corazón, dolor muscular, torceduras, esguinces, deshidratación leve y malestar emocional leve mientras que la medición de la cintura y el peso corporal. También existe la posibilidad de malestar emocional asociado con la dieta. Tenemos la intención de minimizar estos riesgos mediante la inclusión de las progresiones adecuadas y modificaciones a usted y proporcionar descansos regulares de agua. En el caso de que usted siente malestar emocional asociado con la dieta, si es necesario, lo referiremos a un consejero a su propio costo. Además, si se presenta una condición médica, lo referiremos a un médico privado y usted será responsable de los costos. Tenemos la intención de minimizar el riesgo de sentir malestar emocional, proporcionando un ambiente privado y mantener su información confidencial.

¿Cuáles son los posibles beneficios por participar en este programa?
Los posibles beneficios que pueden surgir a partir de los procedimientos descritos en este programa de pérdida de peso, disminución del Índice de Masa Corporal (IMC) valores, un cambio positivo en el bienestar, mejorar el estado físico, una mejor postura y el equilibrio, mejor autoestima, músculos más fuertes y huesos, sentir con más energía, relajación y reducción del estrés, siguió una vida independiente en la vejez, la retención de la información (giraba en torno a la nutrición básica, la actividad física y del comportamiento de auto-gestión) y un menor riesgo de diabetes tipo 2 (y otras enfermedades crónicas relacionadas).
¿Cuáles son las alternativas a la participación?
Si decide no participar en este programa, no hay otra alternativa.

¿Cuáles son los costos, reembolsos y compensaciones para este programa?
No se le pagó por su participación en este programa y no hay ningún costo para usted. Usted no recibirá un reembolso por cualquier gasto de bolsillo, como el aparcamiento, el transporte o los gastos médicos.

RETIRADA O TERMINACIÓN DEL ESTUDIO Y CONSECUENCIAS
Usted es libre de retirarse del estudio en cualquier momento. Si decide retirarse de este estudio debe notificar al equipo de investigación en la primera página de inmediato. El equipo de investigación también puede terminar su participación en este estudio si no se siguen las instrucciones, si se ausenta por más de nueve sesiones, o si su seguridad y bienestar están en peligro. Nosotros le informaremos inmediatamente si esto ocurre.

CONFIDENCIAL
Su información se mantendrá confidencial mediante la sustitución de su nombre con un código. Una lista que une el código y su información de identificación (por ejemplo, esta forma) se guardarán en un archivador cerrado en una oficina facultad seguro y sólo el equipo de investigación en la primera página tiene acceso a este gabinete. Los datos de la investigación de-identificados serán almacenados electrónicamente en una computadora con protección por contraseña en una oficina de seguros en todo momento. Ubicaciones de almacenamiento de información de identificación y de datos de la investigación son identificables tanto en el Departamento de Kinesiología de la Universidad Estatal de California, Northridge y se mantendrá durante al menos 3 años desde la fecha de finalización del programa.
Su consentimiento separado se requiere para acceder a cualquier información derivada de este proyecto de investigación que le identifique personalmente, excepto requerimiento específico de la ley. Publicaciones y / o presentaciones que se deriven de este estudio no incluirá información que le identifique.

¿Qué pasa si tengo preguntas?
Si tiene algún comentario, duda o formular preguntas acerca de la conducta de esta investigación, por favor póngase en contacto con el equipo de investigación que aparece en la primera página de este formulario. Si tiene alguna inquietud o queja sobre el estudio de investigación, el equipo de investigación, o si tiene preguntas sobre sus derechos como participante de una investigación, por favor póngase en contacto con Proyectos de Investigación y patrocinado, 18111 Nordhoff Street, California State University, Northridge, Northridge, CA 91330-8232, o por teléfono 818-677-2901.

DECLARACIÓN DE PARTICIPACIÓN VOLUNTARIA
Usted no debe firmar este formulario a menos que lo lea y reciba una copia de la misma a conservar. La participación en este estudio es voluntaria. Usted puede negarse a contestar cualquier pregunta o descontinuar su participación en cualquier momento sin sanción o pérdida de beneficios a los que tendría derecho. Su decisión no afectará su relación con la Universidad Estatal de California, Northridge. Su firma indica que ha
leído la información de este formulario de consentimiento y he tenido la oportunidad de hacer cualquier pregunta que usted tenga sobre el estudio.

**Estoy de acuerdo en participar en el estudio.**

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