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1.1.

The prevalence of obesity among Mexican Americans has been increasing over the past decade, and is associated with hypertension and diabetes. Secondary data from DREAMS study were used to evaluate whether behavioral intervention on diet and physical activity using *promotores de salud* model significantly reduced blood pressure and body mass index among adult participants. Results showed significant changes in systolic blood pressure after the trial within intervention and control group, without significant difference in changes of blood pressure and body mass index after the trial between groups. These findings suggest that more comprehensive programs are needed to better understand Hispanic population's health behavior.

PROMOTORES DE SALUD OF NORTH TEXAS: IMPACT OF HEALTH EDUCATION INTERVENTION ON THE CHANGE OF BLOOD PRESSURE AND BODY MASS INDEX IN ADULT **PARTICIPANTS IN DREAMS PROJECT 1**

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PROMOTORES DE SALUD OF NORTH TEXAS: IMPACT OF HEALTH EDUCATION INTERVENTION ON THE CHANGE OF BLOOD PRESSURE AND BODY MASS INDEX IN ADULT PARTICIPANTS IN DREAMS PROJECT 1

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CHAPTER I

INTRODUCTION

Modifiable risk factors are leading causes of mortality in the United States (Mokdad, Marks, Stroup, & Gerberding, 2004). Cardiovascular disease (CVD) is one of the six areas targeted by the U.S. Surgeon General's "Healthy People 2010" objectives to help eliminate racial and ethnic disparities in health (US Department of Health and Human Services, 2005). According to 2001 data on mortality in the United States, cardiovascular disease is the leading cause of death among Hispanics (Anderson & Smith, 2003). Data in this report are based on information from all death certificates filed in the US in 2001. Considering the rapid growth of the Hispanic population in the United States and their increased risk of developing heart disease and diabetes, programs that are oriented towards primary and secondary prevention of cardiovascular disease focusing on culturally competent prevention strategies need to be an important part of public health actions.

In the decade between 1990 and 2000, the US Hispanic population increased by more than 57.9 %, becoming the fastest growing and largest minority group in the United States. In the year 2000, there were an estimated 35.3 million Hispanics, 12.5 % of the total US population, with Mexican Americans being the largest ethnically distinct subgroup including 20.6 million people (Guzman, 2001).

Some of the causes of poor health outcomes among Hispanics are language barriers, lack of health insurance and access to preventive health care. Recent U.S. Census Bureau study reports that 32.7% Hispanics are uninsured (DeNavas, Proctor, &

Hill, 2005). Eighty percent of Mexican American adults with hypertension have uncontrolled blood pressure (Glover, Greenlund, Ayala, & Croft, 2005).

Mexican Americans, who present the largest percentage of the U.S. Hispanic population, experience increased prevalence of risk factors for obesity, diabetes, lack of physical activity, which are associated with increased prevalence for cardiovascular disease (Pandey, Labarthe, Goff, Chan, & Nichaman ,2001).

One of the major contributors to increased risk for developing diabetes and CVD is obesity. U.S. Latinos have experienced an 80% increase in obesity in the last decade (Hubert, Snider, & Winkleby, 2005). Obesity can lead to chronic diseases such as high blood pressure, diabetes, stroke, cancer, and diseases of gallbladder, heart, and lungs; it may reduce the quality of life and can also lead to death. Body mass index (BMI) is one of the most commonly used measures of obesity (Hiza, Pratt, Mardis, & Anand, 2001).

Among Americans age 20 and older, 140.0 million are overweight or obese. Of these 60.0 million are obese (National Health and Nutrition Examination Survey, 2001-2004).Overweight and obesity in the US occur at higher rates in racial/ethnic minority populations such as African American and Hispanic Americans, compared with white Americans. The prevalence of obesity among Mexican Americans increased from 28.4% from 1988-1994 to 34.4% from 1999-2000 (American Obesity Association Fact Sheets, 2002). According to the American Obesity Association (AOA), the high prevalence of the obesity is linked to high prevalence of hypertension.

Cultural factors related to dietary preference, physical activity, and environmental factors can contribute to the development of obesity, hypertension, and other chronic

diseases, such as diabetes. Diabetes mellitus (DM) is becoming more common in the United States. According to American Diabetes Association (2007), 20.8 million children and adults-7% of the population have diabetes. From those, there are 14.6 million diagnosed, and 6.2 million people undiagnosed with diabetes. There were 1.5 million newly diagnosed persons with diabetes age 20 and older in 2005. After adjusting for population age differences, Mexican Americans are 1.7 times as likely to have diabetes as non Hispanic whites. If the prevalence of diabetes among Mexican Americans was applied to the total Hispanic/Latino population, about 2.5 million (9.5%) Hispanic/Latino Americans aged 20 years or older would have diabetes (ADA, 2007). From 1990-2005, prevalence of diabetes increased substantially from 26.4 to 54.5 per 1000-4.6% per year. An increased number of persons having diabetes accelerated in 1990, and appears to be linked to escalating obesity (ADA, 2007). These data were announced at the ADA's 67th Annual Scientific Session and were used from the 1963-2005 National Health Interview Survey to obtain nationally representative age-adjusted prevalence and incidence rates.

The prevalence of impaired fasting glucose, the pre-diabetes state is 54 million people (ADA, 2007). People with pre-diabetes will eventually develop true type 2 diabetes. The rate of conversion is approximately 7 to 10 percent per year (Spellman, 2004). Per Spellman, diabetes can be prevented, and the most effective strategy is exercise, healthy nutrition and weight loss. Defining who is at risk population is critical so interventions can be focused on the right persons and started early-on to prevent type 2 diabetes as well as cardiovascular disease.

Lifestyle modifications should be strongly recommended to the entire population. They are effective in preventing obesity, lowering blood pressure and therefore can reduce cardiovascular risk factors. A systematic team approach utilizing health care professionals and community resources can assist in providing necessary education, support, and follow up needed to achieve successful lifestyle changes. Many health programs are choosing community health workers and *promotores de salud* for their unique ability to serve as "bridges" between community members and health care services in health promotion and education (University of Arizona & Annie E. Casey Foundation, 1998).

Purpose of the Study

The purpose of the study was to evaluate whether interactive and individualized behavioral intervention on diet and physical activity using the *promotores de salud* model significantly reduced blood pressure and body mass index among Hispanic adults who participated in DREAMS Project 1.

Research Question/Hypothesis

The study aimed to determine if intervention group participants had a greater reduction of blood pressure and body mass index measurements than control group participants in DREAMS Project 1. The hypothesis was that blood pressure and body mass index levels among adult Dreams study participants randomized to the intervention group, who received health education delivered by *promotores de salud* would be significantly lower than that of adult participants randomized to the control group, who

received educational materials sent by mail and had no direct contact with promotores de salud.

Delimitations

The study was delimited to adults of majority Mexican origin Hispanic families living in Fort Worth area participating in DREAMS Project 1. *Promotores de salud* came from different backgrounds with some differences in teaching abilities. For example, acculturation level of *promotores*, their learning styles, teaching approaches/styles, ability to deliver information, and being able to establish a rapport with participants may have influenced the intervention.

Limitations

The findings of this study may not be generalized to the general Hispanic **population** or to individuals from similar socio economic, demographic, and/or ethnic **backgrounds**.

Assumptions

It is assumed in this study that:

- Blood pressure readings were done properly by the study personnel. Systolic and diastolic blood pressure was measured twice by the same nurse assistant with a five minute interval, and the average of the two readings was recorded to reduce intra-individual variation.
- 2. Weight and height were measured correctly.
- Body mass index was calculated appropriately- the CDC web site calculator was used.

- 4. All *promotores de salud* that delivered the intervention received similar training.
- 5. All *promotores de salud* that delivered the intervention conducted family education sessions similarly.

Definition of Terms

DREAMS- Diabetes, Research, Education and Metabolic Studies (Urrutia-Rojas, et al. 2004).

BMI (Body Mass Index) – a mathematical formula based on a person's height and weight that provides inferences of overweight/obesity. BMI equals weight in kilograms divided by height in meters squared. Formula used to calculate body mass index is: BMI = kg/m2 (CDC, 2007):

Overweight- Body mass index between 25 and 29.9 (CDC, 2007)

Obesity: Body mass index of 30 and above (CDC, 2007).

Blood Pressure - The force of blood against the artery walls (CDC, 2007).

Hypertension- A condition when blood pressure stays too high for too long. Hypertension for adults is defined as a systolic BP (the pressure when heart contracts) of 140 mmHg or higher, or diastolic (the pressure when heart rests between beats) of 90 mmHg or higher (CDC, 2007)

Promotores de Salud- Community health workers (CHW) who are lay members of the community, who work either for pay or as volunteers in association with the local health care system in both urban and rural environments and usually share ethnicity, language, socioeconomic status and life experiences with the community members they serve. They

have been identified by many titles such as community health advisors, lay health advocates, "promotores" (as), outreach educators, community health representatives, peer health promoters, and peer health educators. CHW offer interpretation and translation services, provide culturally appropriate health education and information, assist people in receiving the care they need, give informal counseling and guidance on health behaviors, advocate for individual and community health needs, and provide some direct services such as first aid and blood pressure screening (U.S. Department of Health and Human Services/Community Health Worker National Workforce Study, 2007). Locally, *promotores* have been utilized primarily for recruitment, health education, project data collection, referrals, follow-up, for the sustainability of the programs, and for forming movements on health in communities.

Importance of the Study

Obesity is recognized as an independent risk factor for cardiovascular disease and type 2 diabetes, and is strongly associated with other risk factors, including hypertension. Dietary factors and physical inactivity may predispose individuals to increased risk. Prevalence of obesity among Mexican Americans has been increasing over the past decade. Together with hypertension, it has become one of the major health problems in the U.S. and all over the world. Effective primary prevention programs are crucial in reversing high rates of obesity and hypertension. The use of community health workers or *promotores de salud*, is ideal for chronic diseases prevention programs that focus on life style changes, since they empower and hence influence the community. There is a potential for the results of this study to prevent risk factors for chronic diseases such as

hypertension and to improve public health. Promotoria, with its characteristics of being a culturally and linguistically appropriate health education strategy, has the potential to be integrated into the medical model of patient care and improve primary, secondary, and tertiary prevention services.

CHAPTER II

LITERATURE REVIEW

A comprehensive MEDLINE search of English language articles that identified epidemiological, clinical, and laboratory studies linking risk behaviors and mortality was carried out by Mokdad, Marks, Stroup, & Gerberding (2004). Articles published between 1980 and December of 2002 were reviewed. The 2000 mortality data reported to the Centers for Disease Control and Prevention were used to identify the causes and number of deaths. Results show that the leading causes of death in 2000 were tobacco, and 18.1% of total US deaths were due to poor diet and physical inactivity. The review done by Mokdad et al. (2004) concluded that poor diet and physical inactivity may soon overtake tobacco as the leading cause of death. These findings, along with increasing health care costs and an aging population, argue strongly that the need to establish more preventive orientation in the US health care and public health systems has become more urgent.

There is an evident correlation between cardiovascular risk factors/variables evaluated in this study, obesity (BMI) and hypertension.

Obesity/Body Mass Index

The prevalence of overweight and obesity is increasing worldwide at an alarming rate in both developing and developed countries. Environmental and behavioral changes brought by economic development, modernization, and urbanization have been associated with the rise in global obesity. Obesity is increasing in children and adults, and true health consequences may become fully evident in the near future (American

Obesity Organization Fact Sheets, 2002). U.S. Latinos have experienced an 80% increase in obesity in the last decade (Hubert, Snider, & Winkleby, 2005).

According to the American Obesity Organization (AOA), modernization has led to a consumption of large quantities of food (particularly high caloric intake) and a decrease in overall physical activity, contributing to increased rates of obesity. From 1960 to 2000, the prevalence of obesity (body mass index [BMI]>30 kg/m2) for American adults aged 20-74 years increased from 13.4% to 30.9%. In 2000, the prevalence of overweight (BMI >25 kg/m2) for American adults was 64.5% (Flegal, Carroll, Ogden, & Johnson, 2002).

Overweight and obesity are associated with cardiovascular disease, certain types of cancer, type 2 diabetes, stroke, arthritis, respiratory problems, and psychological disorders, such as depression. High blood pressure is a major risk factor for heart disease and stroke, end stage renal disease and is a chief contributor to adult disability. About 73 million people in the United States age 20 and older have high blood pressure. Hypertension killed 54,707 people in the U.S. in 2004 (American Heart Association, 2007).

The body mass index is one of the most commonly used measures to assess overweight and obesity and monitor changes in body weight. BMI has its limitations because it does not measure body fat or muscle directly. The study done by Noble (2001) on obese women at the Obesity Clinic in San Francisco, showed that the waist-to-hip ratio is a better indicator of poor cardiac status than BMI. Waist-to-hip ratio was significantly linked not only to the two traditional indicators of unfavorable cardiac status

(blood pressure and total cholesterol/HDL cholesterol), but also to triglycerides, another atherogenic index. The findings of this study indicate that waist-to-hip ratios foresee more regarding cardiac status in these patients than measures of height and weight. This supports the recommendation that waist-to-hip ratio becomes a part of the general physical examination.

A cornerstone study in cardio vascular disease (CVD) prevention worldwide was done by Yusuf, Hawken, Ounpuu, et al. (2004). The INTERHEART study was a large, international, standardized, case-control study and included 27,098 participants from 52 countries. One of the findings of the study indicates that BMI showed modest association with myocardial infarction (MI). Waist-to-hip ratio and waist and hip circumference were highly associated with risk of MI, even after adjustment for other risk factors. The data from the INTERHEART study suggested that waist circumference might be a better predictor of CV risk than BMI. Eating fruit and vegetables, exercising regularly and avoid smoking were found to be protective factors in this study: the three together could lead to about an 80% lower risk of myocardial infarction. This confirms the beneficial effects of a healthy lifestyle, and the findings were consistent in both men and women, in all regions of the world and in all ethnic groups. Authors of INTERHEART study concluded that his was a strong argument for promoting a healthy lifestyle as a cornerstone of cardio vascular prevention worldwide.

Excess abdominal fat is an important, independent risk factor for disease. Research shows that waist circumference is directly associated with abdominal fat and can be used in the assessment of the risks associated with obesity or overweight. Women

with a waist measurement of more than 35 inches and men with measurement of more than 40 inches may have more health risks than people with lower waist measurements because of their body fat distribution (National Institute of Health, 2006).

Despite those findings, childhood body mass index is shown to be the predictor of coronary heart disease (CHD) in adulthood (Baker, Olsen, and Sorensen, 2007). Investigators followed 276,835 Danish schoolchildren for whom measurements of height and weight were available. In 5,063,622 person-years of follow up, 10,235 men and 4,318 women for whom childhood BMI data were available received diagnosis of CHD or died of CHD as adults. The risk of any CHD event, fatal or nonfatal event among adults was positively associated with BMI at 7 to 13 years of age for boys and 10 to 13 years of age for girls. The associations were linear with age, and risk increased across entire BMI distribution. Authors conclude that as children are becoming heavier worldwide, greater numbers of them are at risk of having coronary heart disease in adulthood

Body mass index as an indicator of overweight and obesity was used in the San Antonio Heart Study (Hunt, Resendez, Williams, et al. 2003). The study showed that, after adjustment for age and gender, Mexican Americans are at increased risk of all cause, cardiovascular and coronary heart disease mortality relative to non Hispanic Whites. In this study of participants aged 45-64 years, US born Mexican Americans and Mexican born Mexican Americans appeared to be at similar risk of all cause, cardiovascular, and coronary heart disease mortality.

Literature on life style interventions in weight loss in Hispanic population is lacking. Lindberg & Stevens (2007) reviewed online bibliographic databases of published studies that have addressed the effectiveness of weight-loss interventions for Hispanic individuals in the United States, from 1980 to September 2006. Limited number of articles were found, and the authors identified the lack of identifying information on key variables, such as: the criteria to identify the subjects as a "Hispanic", level of acculturation, socioeconomic status (SES), level of education, number of years living in the US, country of origin, and language spoken at home. Further, most available "culturally-sensitive" health-related interventions targeting Hispanic populations did not specify what made interventions "culturally-sensitive" other than educational materials were translated in Spanish. Lindberg and Stevens (2007) identified only three controlled intervention studies specifically targeting Hispanic populations for weight loss. Most of the available studies were not randomized and did not assess key variables mentioned earlier.

One of the earlier studies found by Lindberg and Stevens (2007) in a database review, targeted Hispanic women, and consisted of an 11 week intervention conducted in Spanish by a Hispanic dietitian. The intervention included translation of dietary advice materials in Spanish, adding ethnic food recipes, and emphasizing importance of health for the whole family. Mean weight loss in this study was 8.7 lbs. No information was provided on randomization, session duration, program content, acculturation, and SES. Reported rate of attrition was \geq 50%.

A second study presented in the literature review conducted by Lindberg and Stevens, assessed a family (n=27) versus individual-oriented approach (n=32) in a culturally adapted weight-reduction program for self- identified Mexican American women and compared both of those with manual-only control group (n=27). Both intervention groups attended 24 weekly sessions that included nutrition instructions, food demonstrations, and instructions in health-behavioral strategies. Results show more weight reduction in both intervention groups than in control group. Participants in the family intervention lost an average of 6.6 and 9.9 lbs, and those in the individual group lost an average of 5.7 and 7.2 lbs after three and six months of treatment, respectively.

A third randomized study presented by Lindberg and Stevens examined the effectiveness of a ten-week physical-activity training intervention for weight loss among Hispanic women. The intervention involved instruction in self-change behavior modification strategies, nutritional education, and exercise. At the end of the treatment, women in the treatment group (n=22) had achieved significant reductions in BMI, waist-to-hip ratio, and total serum cholesterol, compared to controls. At three months post-treatment, the data were available for only eight controls and 10 participants. Hip ratio and total cholesterol had returned to baseline levels for both groups, but the intervention group showed an additional reduction of 1.3 kg/m2 on BMI.

The study done by Klohe-Lehman et al. (2006), examined if greater nutrition knowledge versus gains in knowledge would promote more successful weight loss in low-income, overweight and obese African American and Hispanic mothers with young children. Eight-weekly weight-loss classes emphasizing diet, physical activity, and

The survey conducted online in United States by Harris Interactive on behalf of Hypertension Education Foundation and King Pharmaceuticals, Inc. between January 4 and 17, 2007 among 1,245 adults, aged 45 and over diagnosed with hypertension showed that over 22% of Hispanic women and almost 25% of Hispanic men had high blood pressure. The survey indicates that 77% of Hispanic respondents were aware that 120/80 is the optimal blood pressure. Fifty percent of Hispanic participants reported that they are not following a healthy diet because they were taking the medication to control their blood pressure. Specifically, Hispanics were more likely to report not exercising regularly because they were taking blood pressure lowering medication than Caucasian or African American respondents. The survey showed that 19% of Hispanic respondents did not know the specific goals for blood pressure control and 35% reported not having been told their treatment goals by their doctor. Of the Hispanic population surveyed, only 38% exercise regularly and 64% follow a healthy diet, which indicates that many Hispanics do not understand the importance of life style changes in the management of hypertension. According to the survey, Hispanics are under informed about the risks associated with high blood pressure (Harris Interactive/ Hypertension Education Foundation and King Pharmaceuticals. Hypertension education survey, 2007).

According to Turner, Holman, Stratton, et al. (1998), tight control of blood pressure reduced the risk of any non-fatal or fatal diabetic complications and death related to diabetes. This study was conducted in 20 hospitals in England, Scotland, and Northern Ireland and followed 1148 hypertensive patients with type 2 diabetes with a mean blood pressure at entry 160/94mmmHg. Mean blood pressure was significantly

reduced in the group assigned tight blood pressure control (144/82 mmHg) compared with the group assigned to less tight control (154/87mmHg) after 9 years. Six points of blood pressure drop was able to reduce the risk of macrovascular and microvascular complications in type 2 diabetes. These study findings indicated that reducing blood pressure needs to have high priority in caring for persons with type 2 diabetes.

The concept that excess body weight and increased blood pressure are linked was demonstrated many years ago by the Framingham Heart Study investigators (Kannel et al.1967). Similar findings were reported by Narkiewicz (2006), who stated that "it takes two to tango, since obesity is associated with an increased risk of CVD, but this requires that obesity be combined with hypertension" (p2).

Obesity has been recognized as an independent risk factor for cardiovascular disease and is closely associated with hypertension. The mechanisms of obesity-induced hypertension are multifactorial and complex (Wofford, Miller, Harkins et al. 2002). According to Wofford, lifestyle modification, including weight reduction and increased physical activity, can improve blood pressure control in obese, hypertensive persons. The presence of excess abdominal fat that is disproportionate to the total body fat is an independent predictor of risk factors and morbidity.

The Brain Attack Surveillance in Corpus Christi project (BASIC) clearly demonstrated an increased incidence of stroke among Mexican Americans compared with non-Hispanic whites in this community (Morgenstern et al, 2004). According to the BASIC study, Mexican Americans have an increased incidence of intra cerebral hemorrhage and subarachnoid hemorrhage than non –Hispanic whites adjusted for age, as

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well as increased incidence of ischemic stroke and TIA (Transitory Ischemic Attack) at younger age compared with non-Hispanic whites.

A plethora of literature indicates that behavioral intervention on lifestyle changes may reduce the onset of hypertension in persons who are at risk. A study done by Elmer et al. (2006) showed that adults with pre hypertension maintained changes in life style that reduced progression to hypertension for 18 months. Adult volunteers (n=810) with pre hypertension or hypertension stage 1 were enrolled in three groups; a multi component behavioral intervention that implemented established recommendations to combat hypertension; multi component behavioral intervention that implemented established recommendations plus the Dietary Approaches to Stop Hypertension (DASH) diet; and advice only. Results indicated that compared with advice only, both behavioral interventions statistically significantly reduced weight, fat intake, and sodium intake. The group that participated in multi behavioral intervention following established recommendations to combat obesity and DASH intervention also statistically increased fruit, vegetable, dairy, fiber, and mineral intakes.

Trial of hypertension prevention done by Stevens et al. (2001) showed that clinically significant long-term reduction in blood pressure and reduced risk for hypertension could be achieved with even modest weight loss. The aim of the study was to test the efficacy of lifestyle intervention for reducing hypertension over three to four years. Participants were men and women 30 to 54 years of age, who were not taking blood pressure lowering medication with diastolic blood pressure of 83 to 89 mm Hg and systolic blood pressure less than 140mm Hg, and where 110% to 165% of their ideal

body weight at the start of the study. The weight loss intervention included a three year program of group meetings and individual counseling focused on dietary change, physical activity, and social support. The control group received usual care control of hypertension. Weight and blood pressure readings were collected every six months by staff that was blinded to treatment assignment. The results indicated that the blood pressure was significantly lower in the intervention group as compared to control group at 6-, 18-, and 36- months. In subgroup analyses, the intervention participants who lost at least 4.5 kg at six months and maintained this weight reduction over the next 30 months had the greatest reduction of blood pressure.

Meta-analysis of randomized controlled trials done by Neter, Stam, Kok, Grobbee, & Geleijnse (2003) aimed to estimate the effect of weight reduction on blood pressure overall and in population subgroups. Twenty five randomized, controlled trials (comprise 34 strata) published between 1996 and 2002 with a total of 4874 participants from different ethnic populations were analyzed. Different types of weight intervention examined were: Energy restriction, increased physical activity, or the combined intervention. The duration of intervention until the maximal blood pressure (BP) effect was achieved varied from 8 and 260 weeks (mean 35.3 weeks). The mean age of the trial population was 37 to 66 years. Results indicate that there was a blood pressure reduction of -4.4/3.6 mm Hg for an approximately five kilograms weight loss by means of energy restriction, physical activity, or both. In particular, subjects on antihypertensive drug treatment might benefit from weight reduction. This study shows evidence that lifestyle

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modification to reduce body weight need to be a major component in the treatment of hypertension.

Historical overview of Community Health Workers (CHW) Programs

All of the world's cultures have a lay health care system made up of people who are natural helpers-community members whom neighbors approached for social support and advice (Lenninger, 1991). In the United States formal participation of trained workers in this role has been documented since the 1950s (University of Arizona & Annie E. Casey Foundation, 1998). The Federal Migrant Health Act of 1962 and the Economic Opportunity Act of 1964 mandated such outreach, which included employment of community-based service aides in many neighborhoods and migrant worker camps (Hill, Bone, & Butz, 1996).

The U.S. Department of Health and Human Services Administration (U.S HRSA) published Community Health Worker National Workforce Study in March of 2007. This study presents four stages in the Community Health Workers workforce development:

- Early documentation period (1966-1972) is characteristic for engaging CHWs in low income communities and was more related to developing antipoverty strategies than to specific programs for disease prevention and health care.
- Period between 1973 and 1989 was characterized by special projects funded by short term public and private grants, often linked to research with universities.
- 3. State and Federal Initiatives followed between 1990 and 1998 when standardized training for CHWs received greater recognition.

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4. The latest period (1999-2006) is significant for Public Policy actions. Legislation addressing CHWs training and certification was passed in several States and Patient Navigator bill was signed into law as a major piece of legislation at the Federal level addressing CHWs. Also, 2003 Institute of Medicine report on reducing health disparities made recommendations regarding CHW roles (U.S HRSA, 2007).

The largest system to formally use the skills of CHWs was established in 1968, when the Indian Health Service adopted the fledging Community Health Representative Program from the Office of Economic Opportunity. The program was designed to bridge the gaps between people and resources and to integrate basic medical knowledge about disease prevention and care with local knowledge (U.S. Department of Health and Human Services. Indian Health Service, 2008).

The Centers for Disease Control and Prevention has provided leadership in documenting and acknowledging the role of CHWs, establishing the first national database in 1993. It includes CHW programs, training centers, and journal articles on models, research and practice information. The combined Health information Database has documented more than 200 programs, representing about 10,000 CHWs. These estimates are known to be low because the database has not been maintained on a regular basis. In 2002, the CHW programs supported by the Bureau of Primary Care in the HRSA were added to the database. Published literature, related to CHWs is continually added to the database (CDC, 2008).

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The National Community Health Advisor Study, conducted by the University of Arizona and the Annie E. Casey Foundation in 1998, reached almost 400 CHWs across the country to help identify the core roles, competencies, and qualities of CHWs. Seven core roles were identified:

- 1. Bridging cultural mediation between communities and the health care system;
- Providing culturally appropriate and accessible health education and information using popular education methods;
- 3. Assuring that people get the services they need;
- 4. Providing informal counseling and social support;
- Advocating for individuals and communities within the social and health service systems;
- Providing direct services (such as basic first aid) and administering health screening tests;
- 7. Building individual and community capacity.

The National Heart, Lung, and Blood Institute (NHLBI) designed and implemented Salud para su Corazon (Health for Your Heart), a culturally appropriate, community based, theory-driven intervention model. NHLBI's goal was to design an intervention model appropriate for Latino populations to increase awareness about heart disease, and promoting heart-healthy lifestyles (Alcalay, Alvarado, Balcazar, Newman & Huerta, 1999).

According to DiClemente, Crosby & Kegler (2002), community health workers can build partnerships with formal health care delivery systems to connect members of community with the services they need to stimulate social action that influences community participation in the health system and political dynamics. This is one of the major tasks of public health professionals. Considering that CHW are the members of the community with established trust and close relationship with particular community members, they can play the crucial role in empowering that community.

African American persons with diabetes randomized to an integrated CHW and nurse case manager group had after two years greater reduction in A1C values, cholesterol, triglycerides, and diastolic blood pressure than did a routine care group or those led exclusively by CHWs or nurse care managers (Gary et al. 2003).

Compared with a control group, Brazilian community members working with CHWs and implementing the curriculum developed by the New Mexico Diabetes Prevention and Control Program, had improved A1C values (Costa de Forti, 2000). Health outcomes of the Diabetes Prevention Education Program, Border Health Strategic Initiative, Arizona, 1999-2002, indicated that there was a significant decrease in the average random blood glucose measurement, blood pressure, A1C, and self-management behaviors among participants who took part in the diabetes education program utilizing *promotores de salud* (Ingram, Gallegos, & Elenes, 2005). Quantitative and qualitative evaluation of this outreach and education model helped to identify the essential elements of a successful program, including partnership of providers, community diabetes classes, *promotores* outreach and support, linkage between education and clinical care, and program evaluation. Quality of life and in-depth interviews in one of the communities demonstrated the impact of the program on program participants as an attitude change

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toward diabetes. It changed from fear to acceptance and control, which seemed important in improving their emotional well-being.

The evaluation of Salud Para su Corazon (SPSC) - Health for your Heart-National Council of La Raza (NCLR) promotora outreach program done by Balcazar et al (2006) demonstrated specific components of a comprehensive outreach *promotora* program to promote heart-healthy behaviors among Latinos. The training of *promotoras* was a very successful component of the program, and emphasized capacity building, team building, evaluation, and sharing activities. Lead *promotoras* trained 29 field *promotoras* to work directly with 188 Latino families from three NCLR affiliates in Escondido, California, Chicago, Illinois, and Ojo Caliente, New Mexico. Findings from year 1 implementation of SPSC-NCLR programs indicated that *promotora* based partnerships may be comprehensive, and that the approach is feasible to low- income Latino communities. Even though the findings of these programs were not intended to be representative of all Latino communities, they suggested what a *promotora* based community strategy with a **participatory** process could achieve.

Promotores de Salud of North Texas

Considering the increased risk for developing diabetes and CVD in Latino population, regions with growing Hispanic population require the development of comprehensive educational programs to meet the needs of this population to improve their health. The North Texas region, including Dallas, Fort Worth, and Arlington, three metropolitan areas have attracted many Hispanics among five million residents. Medina, Balcazar, Hollen, Nkhoma & Soto Mas, (2007) note that there is an evident necessity for

development of strategies that are culturally and linguistically appropriate using community initiative such as the CHW model. One of the programs using this particular model is Salud para su Corazon of North Texas (SPSCNT). According to Medina et al. (2007), this model is funded by the National Heart, Lung, and Blood Institute (NHLBI) as one of the six of twelve National Enhanced Dissemination and Utilization Centers. SPSCNT distinguishes itself from other CHW programs by developing the program applying participatory perspective and inviting the community to participate. In this environment, a network of Partner Organizations consisting of community agencies/ organizations working with Hispanics was created. Also, SPSCNT established a train-the -trainer model in which NHLBI trained promotoras under the guidance of investigators, trained the local *promotores*, who then took initiative in the recruitment and training process. In addition, SPSCNT worked closely with the Network of Partner Organizations and was able to develop culturally enriched strategies, train promotores, distribute information, and engage community members. In this study, Medina et al.explored the effectiveness of community oriented, environmentally uncontrolled educational intervention delivered by promotores de salud with a goal to facilitate behavior change among Hispanics living in North Texas. This study design is important, as translation of research into community interventions is becoming more applicable in programs dealing with behavior-related risk factors for chronic diseases prevention, including CVD. The study followed two promoter de salud-dosage level groups of participants, pre and post test design: Classroom Group, which received structured promoter intervention in a classroom setting, and Home Group, which received a more informal promoter setting by

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getting health education materials by mail or hand delivered. The results showed that participants in both groups improved in healthy behaviors with positive changes from pre test to post test healthy lifestyle behavior scores. Those results proved that the community outreach *promotores* model can be effective and implemented in different settings. Authors note that even though acculturation was not measured in the study, immigrants with more English language barriers and low acculturation characteristics selected the classroom group. It is recommended that future studies design and explore differences between groups and participants in terms of retention/drop out, attendance in education sessions, response to phone calls etc.

The Promotores de Salud Alliance of Dallas-Fort Worth was among the 22 Health Care Heroes Awards finalists named and won the award by the Dallas Business Journal, September 8 2007. This alliance is a group of lay health workers who have undergone training to conduct outreach activities in the community, such as health fairs, school programs, African American and Hispanic expositions, church events, city-wide forums, university focus groups, university class presentations, grocery tours, food demonstrations, non-profit organization health walks, health networks member participation, and interviews with media.

The *Promotores de salud* model with adaptation to include a diabetes prevention lesson was implemented as an intervention/education strategy in the DREAMS Project 1. Investigators of this proposed project presented several poster sessions on descriptive findings from DREAMS at the American Public Health Association (APHA) meeting in Boston in November 2006, (Hollen, Urrutia-Rojas, Hernandez, Stahl, Vecino, &

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Arslanagic, 2006), as well as poster presentations at the UNTHSC Research Appreciation Day, 2005-2008.

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CHAPTER III

METHODOLOGY

Sampling

The purpose of the study was to evaluate whether interactive and individualized behavioral intervention on diet and physical activity using the *promotores de salud* model significantly reduced blood pressure and body mass index among Hispanic adults who participated in DREAMS Project 1.

Secondary data from the randomized, Primary Prevention Program for Hispanic Families at Risk for Diabetes Mellitus, DREAMS Project 1 was used for the purpose of this study. The aim of the DREAMS Project 1 was to develop an intervention strategy to prevent the onset of vascular disease, diabetes, and metabolic syndrome. Participants recruited for the study were at increased risk of developing diabetes and metabolic syndrome.

DREAMS Project 1 enrolled and screened previously identified nuclear family members of obese Hispanic children at risk for type 2 diabetes and related metabolic disorders. Hispanic families that met the selection criteria and accepted to participate in the program were randomly assigned (n=129) to the intervention program, or to a control group (n=129), receiving print material only. The program was designed to actively involve families and was community oriented for promoting health education delivered by *Promotores de Salud* (lay health educators) developed especially for Hispanics and Latino communities (Balcazar & Hollen, 2004). The outcome of Dreams Project 1 was to monitor change in the pre and post assessments including attitude/behavioral change,

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physical exam, blood pressure, weight, height, waist, waist/hip ratio, laboratory tests including risk indicators for type 2 diabetes (T2DM), and cardiovascular disease, following the educational program (Urrutia-Rojas et. al, 2004). Promotores de Salud are community health workers who are residents of local communities and are able to provide an opportunity to more effectively address health disparities associated with health outcomes of Hispanics.

The program curriculum developed in DREAMS Project 1 consisted of seven topics in six family sessions designed to alter lifestyle patterns and reduce the risk for T2DM and related metabolic disorders. The sessions were designed to promote healthy eating behaviors and physical activity. Participating families received six two-hour lessons. One of six lessons was specifically about diabetes prevention. Family sessions were conducted in the Spanish language, however the curriculum and educational print material was available both English and Spanish. Family sessions were delivered by eight promotores working in pairs per family group, on average five families per group of a total eleven groups at five different locations in the Fort Worth metroplex. Telephone and home visits were conducted as a part of the follow-up protocol. Educational sessions were scheduled weekly for 6 weeks and families were followed for 6 months in order to learn and maintain healthier lifestyle behaviors (Urrutia-Rojas et al, 2004).

Control group participating families received printed educational materials via mail once a month for 6 months and no education from *promotores de salud*. Educational pamphlets were developed and supplied by National Institute of Health, and were mailed to the participants in the following order:

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Pretest day: Recetario /Recipe book

End of month 1: Fotonovela

End of month 2: Stay active & feel better. Take steps to prevent high blood pressure.

End of month 3: Cut down on salt and sodium. Learn your cholesterol number. End of month 4: Protect your heart-lower your blood cholesterol. Cut down on fat not taste.

End of month 5: Watch your weight. Kick the smoking habit.

Hispanic adults (age 18 and older) participating in the original study, either in the intervention or the control group were included in this study.

Instrumentation

The dependent variables analyzed in this study were blood pressure and body mass index in both group of participants, intervention and control. Blood pressure was measured in a sitting position after five minutes resting. Two readings were taken, and the average of two readings was recorded. Weight was measured in pounds using a digital electronic scale (Tanita model TBF-300) on which the participant stood wearing light clothes and no shoes. Height was measured in inches to the nearest 1/16th of an inch using a portable stadiometer. Weight and height were converted to metric units to calculate BMI (kg/m2). Blood pressure and body mass index were measured before and after the intervention.

The intervention used in this study was the independent variable. Whether the subject received intervention or not was treated as a binary variable: for those who

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received intervention, this variable was set as 1; for those who did not receive intervention, this variable was set as zero.

Data Analysis

For data analysis in the study, analysis of variance (ANOVA) was used to compare the changes in blood pressure and body mass index before and after the trial between intervention and control group, with a P value of 0.05 as the significance level.

1. Descriptive analysis was carried out in order to explain the characteristics of the sample studied.

Comparison of blood pressure and BMI was conducted before and after the trial of each individual, and changes in blood pressure and BMI in both the intervention and control group were calculated by taking the difference before and after the trial.
Finally, an evaluation of the findings showed whether the changes in blood pressure and BMI were significantly different between the intervention and control group using ANOVA test.

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CHAPTER IV

RESULTS

The purpose of the study was to evaluate whether interactive and individualized behavioral intervention on diet and physical activity using the *promotores de salud* model significantly reduced blood pressure and body mass index among Hispanic adults who participated in DREAMS Project 1. The number of study participants in the control group was 138 and 133 participants were in the intervention group.

The baseline characteristics of the study participants are shown in Table 1. The average age of the participants was 37.7 in the control group and 36.5 in the intervention group. The average income in the control group was \$1458.6 and \$1551.3 in the intervention group. The mean body mass index in control group averaged 31.8 and BMI averaged 31.4 in intervention group.

The mean systolic blood pressure averaged 119.4 mm Hg in the control group, and the mean for the intervention group averaged 120.3 mm Hg. The mean diastolic blood pressure in the control group was 71.2 mmHg, and 71.6 mmHg in the intervention group.

Variables	Control Mean (S.D.)	Intervention Mean (S.D.)	
Age	37.7 ± 7.8	36.5 ± 6.6	
Income	1458.6 ± 857.6	1551.3 ± 975.8	
Body Mass Index	31.8 ± 6.7	31.4 ± 5.9	
Systolic Blood Pressure	119.4 ± 16.6	120.3 ± 16.6	
Diastolic Blood Pressure	71.2 ± 10.2	71.6 ± 9.7	

Table 1. Characteristics of the Sample Population at Baseline

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Table 2 presents characteristics of categorical variables of study population at baseline. Sixty nine percent represented female participants in control group and 69.9 % in the intervention group. A total of 15.2 % of the control group participants completed less than 12 grade of education, and 12.8 % in the intervention group.

Table 2. Characteristics of the Sample Population at Baseline/Categorical Variables

Variables	Control (%)	Intervention (%)
Gender (Male)	30.7	30.1
Gender (Female)	69.3	69.9
Years of education < 12 Grade	15.2	12.8

Table 3 shows changes in systolic and diastolic blood pressure and BMI within control and intervention group and between both groups with p values. The control group mean systolic blood pressure before intervention was 119.4 mm Hg, and 116.8 mm Hg after the intervention with the p value of 0.0095. There was significant difference in the systolic blood pressure measurements from baseline/before intervention to after intervention measurements in the control group.

In the intervention group, the mean systolic blood pressure before intervention was 120.3 mm Hg, and 117.0 mm Hg after the intervention with the p value of 0.002. This p value indicates significant difference in the change of systolic blood pressure measurements from baseline/before intervention to after intervention in the intervention group of study participants.

The control groups mean diastolic blood pressure before intervention was 71.2 mmHg, and 70.3 mm Hg after the intervention with a non-significant p value of 0.14. The intervention group had a mean diastolic blood pressure before intervention of 71.6 mm Hg, and 70.6 mm hg after the intervention with a non-significant p value of 0.09.

Changes in systolic and diastolic blood pressure before and after the intervention between control and intervention group were not significant with p value of 0.85 for systolic blood pressure and 0.55 for diastolic blood pressure. However, there was a significant decrease in systolic blood pressure for participants in the intervention group as well as those in control group.

Mean BMI before intervention in control group was 31.8, and 31.7 after the intervention with a non-significant p value of 0.57. In the intervention group the mean BMI before the intervention was 31.4, and the same after the intervention with a non-significant p value of 0.52. There was no significant change in BMI before and after intervention between control and intervention group with p value of 0.97.

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Table 3 Changes in Systolic and Diastolic blood Pressure and BMI

Variables	Control Mean + S D	Intervention (%)	P-value
	Mean = 5.D.	Mean ± S.D.	(Detween groups)
Systolic Blood Pressure	119.4 ±16.6	120.3 ±16.6	
before intervention			
Systolic Blood Pressure	116.8 ±16.0	117.0 ±16.2	
after Intervention			
P-value (within groups)	0.0095	0.0022	
Changes in Systolic Blood	0.16 ± 6.93		0.85
Pressure			
Diastolic Blood Pressure	71.2 ±10.2	71.6 ± 9.7	
before intervention			
Diastolic Blood Pressure	70.3 ±10.2	70.55 ± 10.0	
after Intervention	A		20 (8)
P-value (within groups)	0.14	0.09	
Changes in Diastolic Blood	0.91 ± 12.33		0.55
Pressure			
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Body Mass Index before	31.8 ± 6.7	31.38 ±5.9	
intervention			
Body Mass Index after	31.7 ±6.7	31.4 ±6.2	
Intervention			
P-value (within groups)	0.57	0.52	2
Changes in Body Mass	0.007 ±1.46		0.97
Index	4		

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CHAPTER V

DISCUSSION, CONCLUSION AND RECOMMENDATIONS

Discussion

Obesity is recognized as an independent risk factor for cardiovascular disease, and is strongly associated with other risk factors, including hypertension and diabetes. Dietary factors and physical inactivity may predispose individuals to increased risk. The prevalence of obesity among Mexican Americans has been increasing over the past decade. Together with hypertension and diabetes, it has become one of the major public health problems in the US and all over the world. Effective primary prevention programs are crucial in reversing high rates of obesity, hypertension and diabetes. The use of community health workers or *promotores de salud*, is ideal for chronic diseases prevention programs that focus on life style changes, since they empower and hence influence the community.

The study analyzed secondary data from the randomized, Primary Prevention Program for Hispanic Families at Risk for Diabetes Mellitus, DREAMS Project 1. The study included 133 participants in the intervention group and 138 participants in the control group. It demonstrated a significant reduction of systolic blood pressure after the trial within intervention and control group, but no significant difference in diastolic blood pressure after the trial within groups. There was no significant difference in systolic and diastolic blood pressure lowering after the trial between intervention and control group. It was assumed that blood pressure readings were obtained properly by the study personnel. Blood pressure was measured two times, and the average of two readings was recorded to

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reduce intra-individual variation. Further, Dreams study results showed that there was no significant change in BMI after the trial between control and intervention group. It was assumed that height and weight were measured correctly, and that BMI was calculated properly by the study personnel.

Despite a significant decrease in systolic blood pressure for participants in the intervention group as well as those in the control group, the findings of DREAMS project 1 demonstrated that there was no difference in blood pressure and BMI reduction between control and intervention group, whether educational materials were received by mail or health education intervention was delivered by promotores. Pamphlets mailed to the control group participants addressed hypertension and obesity as a risk and included instructions on low sodium diet, low fat diet and exercise. Control group participants may have been more ready to accept and use information on healthier life style received in the mail. Educational sessions moderated by promotores in intervention group were dedicated to teaching about hypertension and healthier behavioral choices to prevent hypertension and obesity. Intervention group participants may not have been compliant with the health education received by promotora in educational sessions. Meeting with interviewers, who were promotores in most cases, could have made participants from both groups feel that they were committing to a program that would help them in reducing health risks. In addition, since participants in both groups were more familiar with the blood pressure measurement procedures at post intervention, they may have been more relaxed and less anxious when their blood pressure was measured after the

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trial. In some cases the "white coat" syndrome needs to be considered as a reason for blood pressure readings to be higher due to the fear of the clinical setting.

As the research literature demonstrated, cardiovascular disease is the leading cause of death for Latinos living in the U.S, but this population is generally unaware of their blood pressure and importance of lifestyle or behavioral changes that can prevent CVD. Tighter blood pressure control decreases the risk of CVD, diabetic complications, kidney and eye disease as well.

The study hypothesis must be rejected since there was no significant difference in changes of blood pressure and body mass index before and after intervention between intervention and control group. This might have been caused by possible interaction between participants from control and intervention group, which may have influenced control group participants to adopt healthier life style using information they may have received from participants in intervention group. These findings may be showing how this population responds to its environment, with social and ethnic differences between groups participating in the study. Duration of the study of only 6 months may be the reason for not showing significant difference between groups. The attendance of participants in the structured education sessions and the ability of individual *promotores de salud* or pairs of *promotores* delivering health education may be considered as a factor, as well as their level of acculturation in comparison to that of adults attending the sessions.

The DREAMS study was delimited to adults of majority Mexican origin in Hispanic families living in Fort Worth area who decided to participate. The findings of

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the study may not be generalized to individuals from specific socio economic, demographic, and/or ethnic backgrounds. *Promotores de salud* came from different backgrounds with some differences in teaching abilities.

Conclusion

The results of DREAMS Project 1 showed no statistically significant difference in blood pressure and BMI after the trial between control and intervention group of participants. Literature review confirmed that the most successful programs in health education and promotion were those with characteristics of collaborative policy change initiative and with established Community Coalitions. The original Promotora model does have a strong community network component which was not utilized in this study, but which could make a difference in better outcomes. The resources and timeline in Dreams study was not conductive to including this important component.

The involvement of *promotores de salud* is a fundamental aspect of the community- building framework because those workers act as advocates of the particular community. They share a deep understanding of cultural beliefs and concerns of community members and definitely have their trust.

The findings of this study are important in understanding of the effectiveness of lifestyle intervention strategies and programs to combat obesity, diabetes, and hypertension in Hispanic population in the Fort Worth area.

Recommendations

The partnerships between universities and communities involving policy makers, creating Community Coalitions, need to be an integral part of health intervention

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strategies making an impact that lives on in the community. The action of all partners of community coalitions is crucial in empowering that community and mobilizing all resources for the common good of a particular community.

Duration of the health education program needs to be considered as a factor in achieving desired outcomes. Longer duration of the programs would allow participants to get ready for the changes and maintain healthier behaviors. Human behavior is very complex and difficult to change, and the follow up, reinforcement, and maintenance of adopted behaviors may be as important as an intervention itself.

As previously discussed, the language barrier and low acculturation of Hispanics in the US and health care access may result in poor health outcomes of this population. The *Promotora* model fills this gap like no other model existing for the Hispanic population in the US. The development of innovative community based participatory research models are needed to assure that appropriate research questions have been asked, and that the distribution of findings to those affected actually happens. As Balcazar et al. suggest:

Community interventions within minority populations need to incorporate empirical translation of research to practical culturally-enriched process dimensions to be effective. Reaching communities is an art. Enhancing the dissemination and utilization of the community participatory process must be included as a part of the "artistic" framework for reaching communities with dignity and commitment to positive and everlasting changes to improve heart health in the Hispanic community. (p.26)

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Body mass index, as the most widely used measure of obesity, was used in this study. The literature showed that it provides a reliable indicator of body fatness for most people and was therefore used to screen for weight categories that may indicate increased health risks. Other indicators of health risks have been studied and presented in literature review. Waist circumference and waist to hip ratio may be a stronger predictor of cardiovascular risk. Waist circumference measures were performed in DREAMS Project 1, and those may be analyzed in future studies of the relationship between waist and cardiovascular risk.

Literature on life style intervention in weight loss in Hispanic population is lacking (Lindberg & Stevens, 2007). In limited number of articles found, Lindberg & Stevens identified the lack of identifying information on key variables, such as: the criteria to identify the subjects as a "Hispanic", level of acculturation, socioeconomic status, level of education, number of years living in the US, country of origin, and language spoken at home. Further, most available "culturally-sensitive" health-related interventions targeting Hispanic populations did not specify what made interventions "culturally-sensitive" other than educational materials were translated in Spanish.

A final recommendation is that more comprehensive programs are needed to better understand Hispanic population's health behavior.

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