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Investigating the Outcomes of Two Chronic Disease Self-Management Programs and Understanding the Correlates of Completion for Each Program

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FLORIDA INTERNATIONAL UNIVERSITY

Miami, Florida

INVESTIGATING THE OUTCOMES OF TWO CHRONIC DISEASE SELF-MANAGEMENT PROGRAMS AND UNDERSTANDING THE CORRELATES OF COMPLETION FOR EACH PROGRAM

A dissertation submitted in partial fulfillment of the
requirements for the degree of
DOCTOR OF PHILOSOPHY
in
PUBLIC HEALTH
by
Michael Andrew Melchior

2012

To: Interim Dean Michelle Ciccazzo
Robert Stempel College of Public Health and Social Work

This dissertation written by Michael Andrew Melchior, and entitled Investigating the Outcomes of Two Chronic Disease Self-Management Programs and Understanding the Correlates of Completion for Each Program, having been approved in respect to style and intellectual content, is referred to you for judgment.

We have read this dissertation and recommend that it be approved

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ABSTRACT OF THE DISSERTATION

INVESTIGATING THE OUTCOMES OF TWO CHRONIC DISEASE SELF-MANAGEMENT PROGRAMS AND UNDERSTANDING THE CORRELATES OF COMPLETION FOR EACH PROGRAM

by

Michael Andrew Melchior

Florida International University, 2012

Miami, Florida

Professor Richard C. Palmer, Major Professor

Chronic disease affects 80% of adults over the age of 65 and is expected to increase in prevalence. To address the burden of chronic disease, self-management programs have been developed to increase self-efficacy and improve quality of life by reducing or halting disease symptoms. Two programs that have been developed to address chronic disease are the Chronic Disease Self-Management Program (CDSMP) and Tomando Control de su Salud (TCDS). CDSMP and TCDS both focus on improving participant self-efficacy, but use different curricula, as TCDS is culturally tailored for the Hispanic population. Few studies have evaluated the effectiveness of CDSMP and TCDS when translated to community settings. In addition, little is known about the correlation between demographic, baseline health status, and psychosocial factors and completion of either CDSMP or TCDS. This study used secondary data collected by agencies of the Healthy Aging Regional Collaborative from 10/01/2008 - 12/31/2010. The aims of this study were to examine six week differences in self-efficacy, time spent performing physical activity, and social/role activity limitations, and to identify correlates of program completion using baseline demographic and psychosocial factors. To examine if differences existed a general linear model was used. Additionally, logistic regression was used to examine correlates of program completion. Study findings show that all measures showed improvement at week six. For CDSMP, self-efficacy to manage disease (p = .001), self-efficacy to manage emotions (p = .026), social/role activities limitations (p = .001), and time spent walking (p = .008) were statistically significant. For TCDS, self-efficacy to manage disease (p = .006), social/role activities limitations (p = .001), and time spent walking (p = .016) and performing other aerobic activity (p = .005) were significant. For CDSMP, no correlates predicting program completion were found to be significant. For TCDS, participants who were male (OR=2.3, 95%CI: 1.15-4.66), from Broward County (OR=2.3, 95%CI: 1.27-4.25), or living alone (OR=2.0, 95%CI: 1.29-3.08) were more likely to complete the program. CDSMP and TCDS, when implemented through a collaborative effort, can result in improvements for participants. Effective chronic disease management can improve health, quality of life, and reduce health care expenditures among older adults.

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LIST OF ABBREVIATIONS

ADL	Activities of Daily Living
ANOVA	Analysis of Variance
BRFSS	Behavioral Risk Factor Surveillance Survey
CDC	Centers for Disease Control and Prevention
CDSMP	Chronic Disease Self-Management Program
DISTANCE	Diabetes Study of Northern California
GLM	General Linear Model
HARC	Healthy Aging Regional Collaborative
HFSF	Health Foundation of South Florida
HRQoL	Health Related Quality of Life
LET	Local Evaluation Team
LRT	Likelihood-Ratio Test
NCOA	National Council on Aging
PAM	Patient Activation Measure
REACH U.S.	Racial and Ethnic Approaches to Community Health across the United States
SCT	Social Cognitive Theory
TCDS	Tomando Control de su Salud
WWE	Walk With Ease

Chapter 1

Introduction

Statement of the Problem

It is estimated that the number of people over the age of 65 in the United States, in 2008, was 39 million, with 5.7 million of those being over the age of 85 (U.S.Census Bureau, 2010a). It is expected that there will be nearly 88.5 million individuals in the Unites States who are 65 years or older by 2050 (U.S.Census Bureau, 2010a), with 7.3 million being over the age of 85 by 2020 (US Department of Health and Human Services, 2005). This growing segment of the population will experience an increase in life expectancy (Martini, Garrett, Lindquist, & Isham, 2007; Rice & Fineman, 2004) which will lead to a greater incidence of age-associated health problems and disabilities (Cacioppo, Hughes, Waite, Hawkley, & Thisted, 2006; Heikkinen & Kauppinen, 2004; Brummett et al., 2001; House, Landis, & Umberson, 1988). Treatment of these conditions will lead to an increase in health care costs (Martini et al., 2007; Rice & Fineman, 2004).

One of the most common health problems affecting the general population, as well as older adults, is chronic disease (World Health Organization, 2010; Holman & Lorig, 2000). Chronic disease is defined as a disease that persists for three or more months, may be recurrent, and cannot be cured (World Health Organization, 2010). As of 2005, 133 million Americans, 45% of the general population, were affected by at least one chronic disease (Redman, 2005). This estimate is expected to rise due to a rising trend of inadequate physical activity and poor dietary habits in the United States (Behringer & Friedell, 2006; Hartley, 2004; Macera, Hootman, & Sniezek, 2003; U.S.Department of Health and Human Services, 2001; Martinson, O'Connor, & Pronk, 2001; Dessai, Zhang, & Hennesey, 1999; National Institutes of Health, 1996a; National Institutes of Health, 1996b). Among older adults, the prevalence of chronic conditions is staggering. Of the 80 million people over the age of 65, approximately 80% have at least one chronic disease (National Center for Chronic Disease Prevention and Health Promotion, 2011). Research has shown that people with one chronic disease are more likely to develop more chronic diseases (Tucker-Seeley, Li, Sorensen, & Subramanian, 2011; National Heart Lung and Blood Institute, 2008), and the majority of older adults manage two or more chronic diseases simultaneously (Wolff, Starfield, & Anderson, 2002; Guralnik, LaCroix, Everett, & Kova, 1989). Currently, 50% of individuals diagnosed with a chronic disease, have more than one, and in persons 65 years and older, approximately 75% have more than one chronic condition (Agency for Healthcare Research and Quality, 2008; van den Akker, Buntinx, Metsemakers, Roos, & Knottnerus, 1998; Hoffman, Rice, & Sung, 1996). It is expected that multiple morbidity, having more than one chronic disease at the same time, will continue to rise as the population ages in the United States (Schoenberg, Bardach, Manchikanti, & Goodenow, 2011; van den Akker, Buntinx, Metsemakers, & Knottnerus, 2000; van den Akker et al., 1998; Knottnerus, Metsemakers, Hoppener, & Limonard, 1992).

Associated with an increase in chronic disease prevalence, is a corresponding increase in health care costs. It is estimated that between 70% and 92% of all health care expenditures result from chronic disease (Thorpe & Howard, 2006; Hoffman et al., 1996). This estimate would put the cost of chronic disease treatment over $100 billion in the United States, and is attributed to increased diagnosis and the intensive management of certain chronic diseases (Thorpe & Howard, 2006). Given the impact that chronic diseases have on the health care system, efforts are needed to ensure that older adults effectively manage their diseases (Holman & Lorig, 2000).

With an increase in number of people over the age of 65 and rising health care costs, self-management by older adults of their chronic conditions is an important public health priority (McDonald, Rogers, & Macdonald, 2008), and is considered a best practice by the World Health Organization (World Health Organization, 2001). Due to the lack of available resources within the health care system and the established norm of providing acute care (McDonald et al., 2008; Bodenheimer, Lorig, Holman, & Grumbach, 2002), older adults are often faced with managing their own diseases (Funnell, 2010; McDonald et al., 2008; Grey, Knafl, & McCorkle, 2006; Holman & Lorig, 2000; Norburn et al., 1995). Many of those suffering from a chronic disease are not able to manage their conditions effectively, with African Americans and Hispanics reporting lower levels of symptom management self-efficacy (Bethell, Lansky, & Fiorillo, 2001). Common reasons cited for older adults having difficulty with self-management include depression (Gerber et al., 2011), low health literacy (Gerber et al., 2011; Schoenberg et al., 2011), hearing impairment (Gerber et al., 2011), and difficulty accessing health care resources (Schoenberg et al., 2011). A circumstance unique to those with multiple morbidities, is the likelihood that self-management regimens may be complex and contradictory (Schoenberg et al., 2011). One recommendation for improving engagement in, and adherence to, self-management is to offer patients a variety of possible skills they could choose from and different education delivery methods (Gerber et al., 2011). This would assist in the adoption of a self-management regime based on an individual's preferences, access to personal and health care service resources, and their degree of self-efficacy (Gerber et al., 2011; Schoenberg et al., 2011).

To help improve self-management of chronic conditions, self management programs have been created and extensively promoted in the United States (Lorig & Holman, 2003). The main goal of self-management is to have the patient improve their health through active participation with their health care provider (Bell & Orpin, 2006), or at the very least to control existing symptoms in order to prevent further disability (Creer, Holroyd, Glasgow, & Smith, 2004). Self-management often requires the individual to follow a plan of action and alter their cognitive and behavioral processes (Van Tulder, Ostelo, Vlaeyen, & et al, 2004; Harvey & Misan, 2003; Barlow, Wright, Sheasby, Turner, & Hainsworth, 2002; Wagner, Austin, & Von, 1996; Ignacio-Garcia & Gonzales-Santos, 1995; Greene & Blanchard, 1994). Objectives of self-management programs often include physical symptom management, improved independence, and increased quality of life (Kennedy, Hopwood, & Duff, 2001) and are available for many different chronic conditions (Lorig & Holman, 2003). Most self-management programs do not take place in a clinical setting, but more of a social environment, while still collaborating closely with health care professionals (Bodenheimer et al., 2002). Though in use for many years, it was only in the last few decades that self-management education has become nationally recognized as an aspect of quality care (Institute of Medicine Committee on Health Care in America, 2001). The aim of self-management education programs is to help the patient acquire the knowledge of preventive or therapeutic health care options, and the self-efficacy to perform these actions (Holroyd & Creer, 1986).

Specific Aims

This study analyzed data collected from the Chronic Disease Self-Management Program (CDSMP) and a Spanish-language counterpart Tomando Control de su Salud (TCDS) offered as part of the Healthy Aging Regional Collaborative (HARC). The HARC consists of 18 area agencies funded by the Health Foundation of South Florida to deliver evidence-based health promotion programs to older adults throughout Broward, Miami-Dade, and Monroe Counties. CDSMP and TCDS were the two programs chosen by the HARC to target chronic disease self-management.

CDSMP and TCDS do not focus on the self-management of a specific disease, but rather strive to provide patients with greater self-efficacy and skills to manage any chronic disease (Golin, DiMatteo, Duan, Leake, & Gelberg, 2002). The purpose of this investigation was to evaluate whether a chronic disease self-management program, when implemented by community-based agencies in South Florida, could increase symptom management self-efficacy, social activity, and time spent exercising. An additional aim of this study was to identify factors that might provide insight into why individuals complete or do not complete a chronic disease self-management workshop.

The majority of evaluations of self-management programs are based on controlled trials (Bodenheimer et al., 2002). In line with this standard, it is not well known how effective CDSMP or TCDS are outside of controlled trials. To date, only a limited number of translational studies have been published and have included small sample sizes which reduces overall generalizability of study findings (Lorig, Ritter, & Jacquez, 2005; Farrell, Wicks, & Martin, 2004). One study, by Farrell, Wicks, and Martin, recruited only 48 participants from a rural setting (Farrell et al., 2004). Additionally, since all previous studies have been conducted in well controlled settings, it is unclear how effective CDSMP or TCDS are when implemented by community-based agencies. This discrepancy between the evaluation and delivery settings presents the opportunity to evaluate the outcomes of self-management programs when translated to community-based organizations for implementation. In addition, the lack of literature available on predictors of completion for older adults participating in health education programs provides an opportunity for this study to present findings that may provide insight on factors that affect completion and program attrition.

Given that there is limited information about translating CDSMP and TCDS to public health practice settings, this study had two central aims. The first aim evaluated program outcomes to see if the translated programs were successful. The second aim identified demographic and psychosocial variables that could possibly explain participant completion of programs.

The following research questions and hypotheses will be investigated and presented as separate manuscripts:

Question # 1: Will the difference in outcomes measured at baseline and six-weeks be statistically significant for participants in CDSMP?

Hypothesis # 1: Participants attending at least four of the six sessions will show statistically significant outcome improvements across all measures after participating in CDSMP.

Question # 2: Will the difference in outcomes measured at baseline and six-weeks be statistically significant for participants in TCDS?

Hypothesis # 2:	Participants will show statistically significant outcome improvements across all measures after participating in TCDS.
Question # 3:	Do the demographic factors of gender, age, race/ethnicity, level of income, marital status, and the baseline measurements of self-efficacy score, health distress score, and health care utilization in the past six months predict program completion?
Hypothesis # 3:	The demographic factors of gender, age, race/ethnicity, level of income, marital status, and the baseline measurements of self-efficacy score, health distress score, and health care utilization in the past six months will predict the ability of participants to complete the programs.

Theoretical Perspective

This study was guided by the theory of self-management and is based on conceptual work by Albert Bandura who proposed that self-management relies on social learning and behavioral theories, which emphasize the person's abilities as an active learner in social contexts (Bandura, Adams, & Beyer, 1977). The aim of self-management education programs is to help the patient acquire the knowledge of preventive or therapeutic health care options, and the self-efficacy to perform these actions (Holroyd & Creer, 1986).

Social Cognitive Theory (SCT), proposed by Bandura, is often used to help researchers understand the behavior of people (Bandura, 1997; Bandura et al., 1977). According to SCT, three constructs to consider are the environment, the situation of the patient, and the patient's self-efficacy. The environment of the patient is often defined as the factors that are external. Examples of an environmental factor include finances, social pressures, and lack of access to health care (Glasgow, 1994). The situation of a patient includes both perception of the environment and the influence it has on behavior, including the perception of support (Baranowski, Perry, & Parcel, 1997). Self-efficacy refers to a person's confidence in their ability to perform a certain behavior (Bandura, 1997; Bandura et al., 1977). If a complete education program was presented to a patient, but the patient did not have the confidence to control or change their condition (self-efficacy), they would not be able to properly self-manage their chronic disease (Bandura & Wood, 1989). Improved patient self-efficacy translates to improvement in health behavior, chronic disease outcomes, and ultimately quality of life (Kennedy et al., 2007; Griffiths et al., 2005; Barnason et al., 2003; Dallow & Anderson, 2003; Tsay, 2003; Brody et al., 2002; Kukafka, Lussier, Eng, Patel, & Cimino, 2002; Lorig et al., 2001; Warnecke et al., 2001; Lorig et al., 1999; Goeppinger, Arthur, Baglioni, Jr., Brunk, & Brunner, 1989).

Significance of Study

For both CDSMP and TCDS, evaluation studies have relatively small samples and have been delivered in a well controlled setting. An outcome evaluation on the ability of multiple, community agencies to produce the desired outcomes for either program in a real-world setting has not before been published. Since there is a great need for chronic disease self-management programs, based on an aging population and increasing prevalence of chronic disease, it is likely that community agencies will be the vehicle for wide scale implementation (Mays, Scutchfield, Bhandari, & Smith, 2010; Funnell, 2010). With limited resources available to community agencies, achievement of beneficial outcomes are crucial to program sustainability (Mays et al., 2010). The success of the HARC in implementing chronic disease self-management programs may encourage other community-level agencies and service organizations to follow its lead.

In addition, no studies were found in the current literature on demographic or psychosocial factors that predict the ability of older adults to meet the completion requirements of CDSMP and TCDS, by attending four of the six education sessions. Being able to identify the influence of gender, age, race/ethnicity, level of income, marital status, as well as self-efficacy, health distress, and health care utilization, will help those implementing the programs to know which participants, once enrolled, can be targeted with measures to decrease attrition.

Overview of dissertation

Chapter one has provided an introduction to the study and provides research aims that this study will investigate. In Chapter two, a review of the literature regarding chronic disease, self-management programs, and predictors of program completion will be presented. Chapter three is a manuscript that answers research question one by evaluating the outcomes of CDSMP. Chapter four is a manuscript that answers research question two by evaluating the outcomes of TCDS. Chapter five is a manuscript that answers research question three by attempting to identify the demographic and psychosocial factors that correlate with the completion of CDSMP and TCDS. Chapter six will present overall conclusions regarding findings from all three papers.

Chapter 2

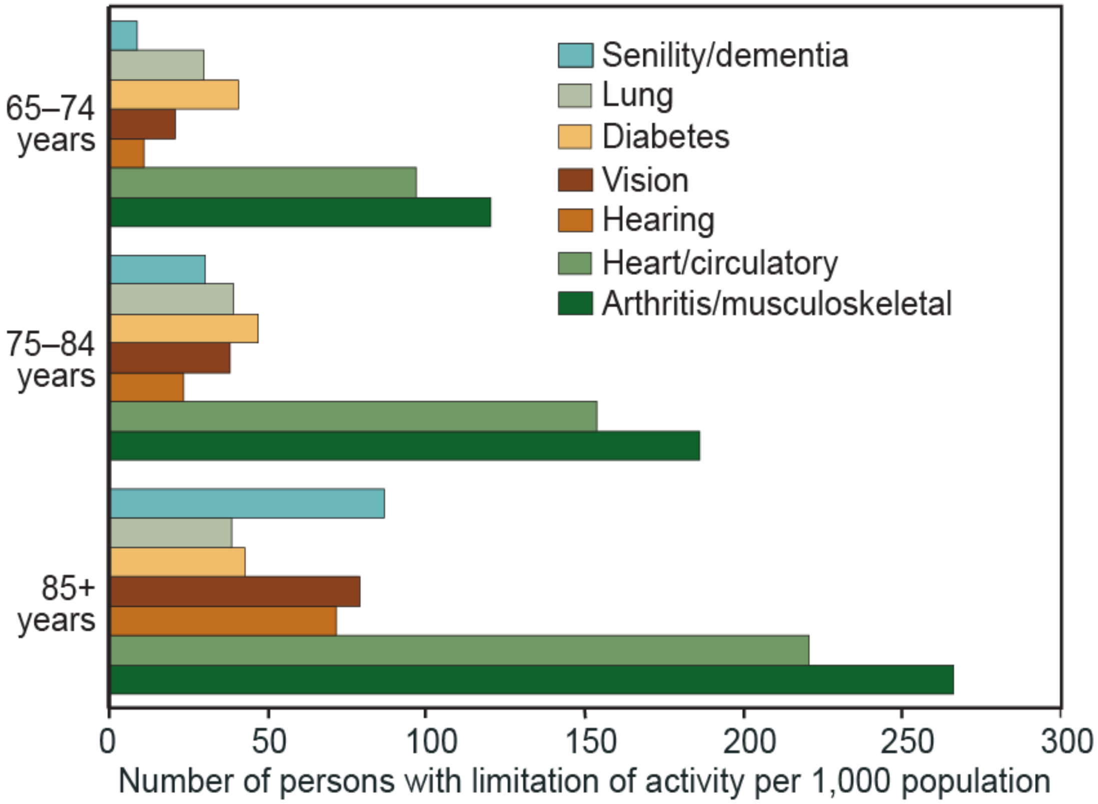
Literature Review

Widespread Effects of Chronic Disease

Of those currently over the age of 65, approximately 80% have at least one chronic disease (National Center for Chronic Disease Prevention and Health Promotion, 2011). The most common chronic diseases among older adults include hypertension, heart disease, diabetes mellitus, cancer, arthritis, and respiratory illnesses, such as asthma, emphysema, and chronic obstructive pulmonary disease (Hung, Ross, Boockvar, & Siu, 2011). Chronic disease can affect quality of life by limiting daily activities, as shown in Figure 2.1 (Centers for Disease Control and Prevention & National Center for Health Statistics, 2007a).

Chronic disease not only places a burden on the individual suffering, but also on the health care delivery system, due to a rapid increase in prevalence (Wagner et al., 2001). Regardless of the disease type, common issues for the individual and personal caregivers include physical, psychological, and social demands (Wagner et al., 2001). For many years the health care system focused on treatment rather than prevention, but the new demand for treatment has caused the realization that prevention of, not only chronic disease incidence, but also halting disease progression is necessary if the system is to maintain the provision of adequate services (Institute of Medicine Committee on Health Care in America, 2001). A study by the Institute of Medicine stated that making the current system work harder is not a viable option; rather a system change is necessary (Institute of Medicine Committee on Health Care in America, 2001).

Figure 2.1 Activity limitation among older adults due to chronic conditions, 2004-2005



SOURCES: Centers for Disease Control and Prevention, National Center for Health Statistics, *Health, United States, 2007*, Figure 16. Data from the National Health Interview Survey.

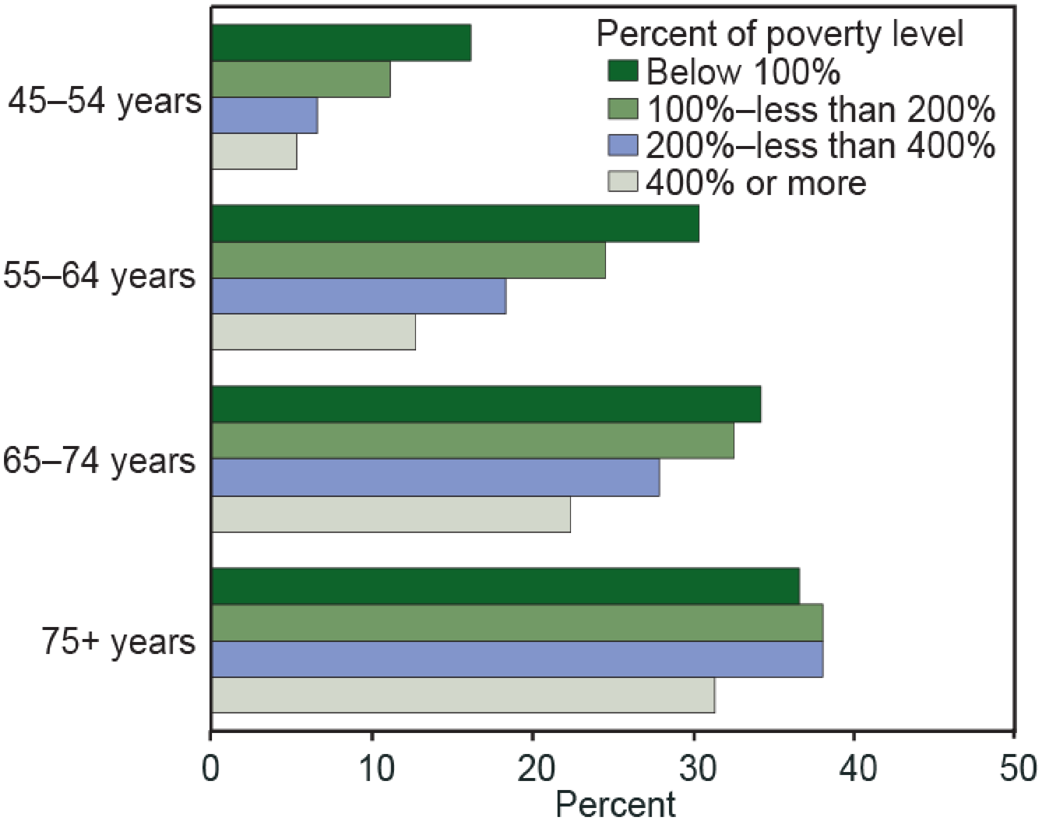
A report from the Robert Wood Johnson Foundation found that Americans with chronic disease are twice as likely to rate their health as poor or fair and also twice as likely to report having a "bad day"(Bethell et al., 2001). Compared to the general population where 56% describe their overall health as excellent or very good, only 25% of those with chronic disease do the same (Bethell et al., 2001). One study found that older adults who remain engaged in volunteer or paid activities for more than 100 hours per year, were 67% less likely to report health problems, including previously existing ones (Culliname, 2006). While chronic disease affects physical health, it has been shown that those with a chronic disease show no significant differences regarding mental health and overall functionality compared to those without a chronic disease (Bethell et al., 2001). The lowest average health status was reported by individuals suffering from diabetes or cardiovascular disease (Bethell et al., 2001). Compared to the general population, those with a chronic disease engage in risky health behaviors at similar rates and report similar levels of self-efficacy (Bethell et al., 2001).

People with one chronic disease are more likely to develop more chronic diseases (Tucker-Seeley et al., 2011; National Heart Lung and Blood Institute, 2008), with the majority of older adults managing two or more chronic diseases at the same time (Wolff et al., 2002). Comorbidities, two or more chronic diseases at the same time, can greatly influence the overall quality of life and self-efficacy of an individual (Agency for Healthcare Research and Quality, 2008; Wolff et al., 2002). The statistics of comorbidity show a serious problem facing the elderly in the United States with 33% of older adults having three or more chronic diseases (Partnership for Solutions, 2004). Figure 2.2 shows the prevalence of older adults with three or more chronic diseases by income level, highlighting a significant disparity (Centers for Disease Control and Prevention & National Center for Health Statistics, 2007b).

Demographics

As of 2008, there were 38.9 million people aged 65 or older in the United States (U.S.Census Bureau, 2010a). From 1900 to 2004, the percentage of older adults tripled from 4.1% to 12.4% with the actual number of people increasing by nearly twelve times (US Department of Health and Human Services, 2005). It is projected that by 2050, there will be 88.5 million older adults in the United States (U.S.Census Bureau, 2010a).

Figure 2.2 Three or more chronic conditions among adults 45+ years, 2005

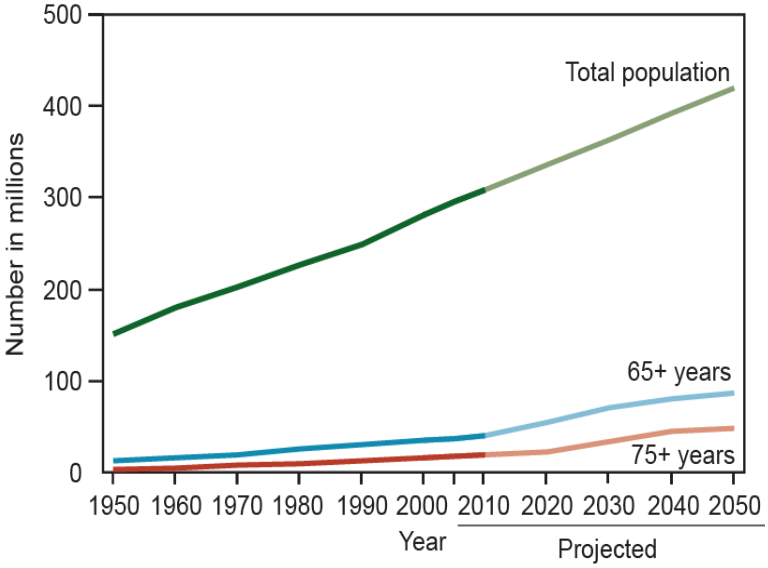


SOURCES: Centers for Disease Control and Prevention, National Center for Health Statistics, *Health, United States, 2007*, Figure 17. Data from the National Health Interview Survey.

This is attributed to aging baby boomers and an increase in life expectancy (NGA Center for Best Practices, 2010). Figure 2.3 shows the projections of population growth for those 65 and older, 75 and older, compared to the general population (Centers for Disease Control and Prevention & National Center for Health Statistics, 2007c). Hispanic older adults are expected to increase in number by 254% between 2000 and 2030, compared to 147% for African Americans and 74% for Whites (US Department of Health and Human Services, 2005). Of those over the age of 65 in 2004, 8.2% were African American and 6.0% were Hispanic. When looking at Hispanics as a subset, only 6.8% are over the age of 65. This same statistic is 8.3% for African Americans and 15.0% for whites (US

Department of Health and Human Services, 2005). For those over the age of 65, regardless of race, 9.7% live in poverty and 26.4%are said to be near poor (National Center for Health Statistics, 2010). When factoring in race and ethnicity, 17.1% of Hispanics, 23.2% of African Americans are considered poor, compared to 7.4% of non-Hispanic Whites (U.S.Census Bureau, 2009).

Figure 2.3. Population growth from 1950 to 2050, total population and older population



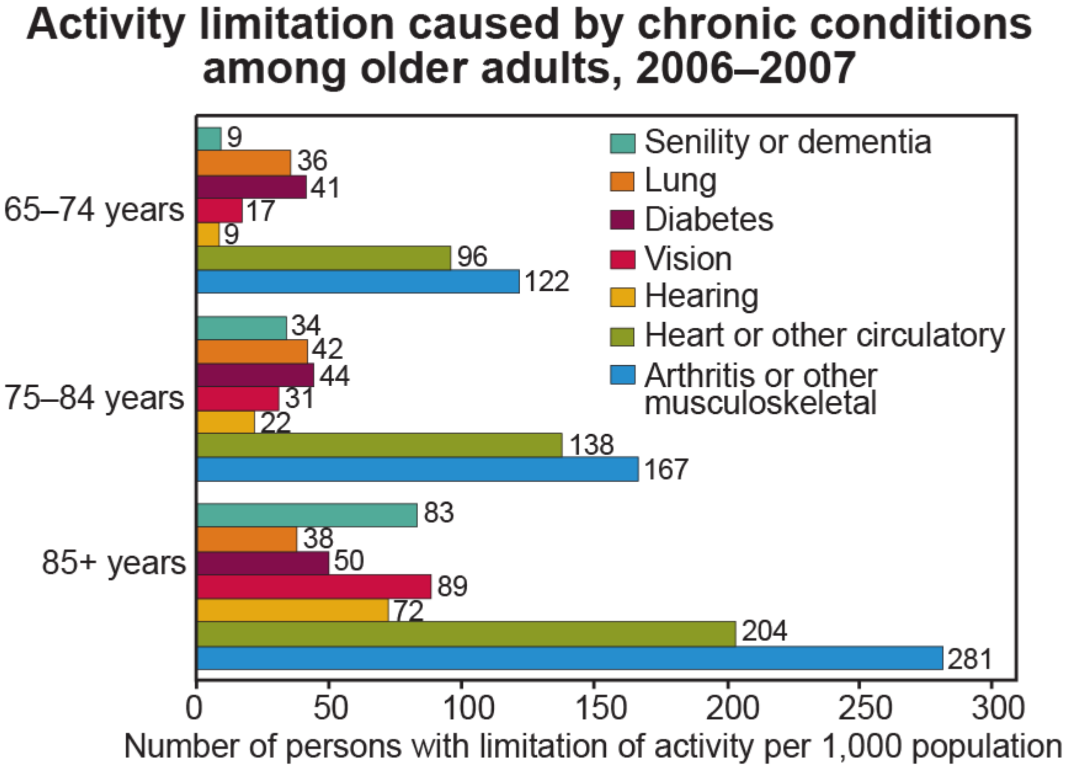
SOURCES: Centers for Disease Control and Prevention, National Center for Health Statistics, *Health, United States, 2007*, Figure 1. Data from the U.S. Census Bureau.

In Florida, 17.4% of the population is over 65 (U.S.Census Bureau, 2010f). The percent of the population in the intervention counties is as follows: 14.5% for Broward (U.S.Census Bureau, 2010e), 15.4% for Miami-Dade (U.S.Census Bureau, 2010g), and 15.9% for Monroe County (U.S.Census Bureau, 2010h). This equals a total of 635,000 county residents over the age of 65. South Florida is a diverse community with residents of all races and ethnicities. In Broward County, 60.2% of residents are White, 25.5%

Black, 3.1% Asian, and 1.5% reporting two or more races (U.S.Census Bureau, 2010e). Persons reporting Hispanic or Latino origin in Broward County account for 24% of the population (U.S.Census Bureau, 2010e). In Miami-Dade County, 77.4% of residents are White, 19.5% Black, 1.6% Asian, and 1.0% reporting two or more races (U.S.Census Bureau, 2010g). Persons reporting Hispanic or Latino origin in Miami-Dade County account for 62.4% of the population (U.S.Census Bureau, 2010g). In Monroe County, 91.6% of residents are White, 5.4% Black, 1.3% Asian, and 1.2% of residents report two or more races (U.S.Census Bureau, 2010h). Persons reporting Hispanic or Latino origin in Monroe County account for 18.9% of the population (U.S.Census Bureau, 2010h).

Disability is more prevalent among people over the age of 65 (National Center for Chronic Disease Prevention and Health Promotion, 2011). Figure 2.4 shows the rates of activity limitation for older adults by chronic disease type (National Center for Health Statistics, 2010). As of 2007, 35% of adults over the age of 65 years reported having activity limitations due to chronic disease (National Center for Health Statistics, 2010). In Broward County, 41.1% of the residents over the age of 65 have at least one disability (U.S.Census Bureau, 2010d). In Miami-Dade County, 45.5% of the residents over the age of 65 have at least one disability (U.S.Census Bureau, 2010b). In Monroe County, 33.9% of the residents over the age of 65 have at least one disability (U.S.Census Bureau, 2010c).

Figure 2.4 Activity limitation caused by chronic conditions among older adults, 2006-2007



SOURCE: CDC/NCHS, *Health, United States, 2009*, Figure 15. Data from the National Health Interview Survey.

Social Cognitive Theory

Social Cognitive Theory (SCT), originally Social Learning Theory, was introduced by Albert Bandura in 1962 (Bandura, 1962) and considers psychosocial dynamics that influence health behavior and suggests methods to promote behavioral change (Baranowski et al., 1997). In 1963, Bandura and Walters challenged the long standing operant learning theory by stating that it was possible to learn new behaviors simply through observation rather than requiring direct rewards alone (Bandura & Walters, 1963). The impact of seeing positive outcomes for others, as a result of their behavior, can in turn motivate a person to repeat those same behaviors in the hopes of achieving the same outcome (Bolles, 1972). Another motivator for behavior within SCT is the combination of both goal setting and self-evaluative reactions (Bandura, 1977b). A person that is unable to meet a goal set by themselves, will then be incentivized for increased action through negative self-appraisal, and once a goal is met, the person will then set higher goals seeking greater satisfaction (Bandura, 1977a; Bandura, 1976).

Since it was first introduced, SCT has evolved from generalized behavior theories to a focus on the individual person being in control of his own life (Bandura, 1997) and is often used to help researchers understand the behavior of people (Bandura, 1997; Bandura et al., 1977). SCT is relevant to health education programs because it allows the application of theories developed in other disciplines, synthesizes the knowledge underlying behavioral, emotional, and cognitive behavior change, and suggests avenues for new research (Baranowski et al., 1997).

Reciprocal Determinism

While often thought of as being unilaterally tied to the person, other factors can influence behavior (Bandura, 1978). In 1978, Bandura proposed the concept of reciprocal determinism which posits that the environment, the person, and behavior continuously interact with each other (Bandura, 1978). Changing one of the components will, in turn, have an effect on the others (Bandura, 1986; Bandura, 1978). The environment of the patient is defined as those factors that are both objective and physically external (Baranowski et al., 1997). Examples of environmental factors include finances, social pressures, availability of resources, and lack of access to health care (Baranowski et al., 1997; Glasgow, 1994). The situation of a patient is defined as their perception of the environment, both real and imagined, and the influence it has on their behavior, including their perception of social support (Baranowski et al., 1997). Together, environment and situation can be used to understand behavior through an ecological framework (Parraga, 1990). For example, in 1993, Domel et al., found that the best way to increase the consumption of fruits and vegetables among 4th and 5th graders, was to increase their availability (environment), increase the desire to eat fruits and vegetables (personal), and provide skills on preparation of fruits and vegetables (behavior) (Domel et al., 1993).

Self-efficacy

Building on the idea of the person and behavior influencing each other, Bandura proposed the concept of self-efficacy (Bandura, 1977a; Bandura, 1977b). Self-efficacy, which underlies many aspects of social change (Bandura, 1995), refers to a person’s confidence in their ability to perform a certain behavior (Bandura, 1997; Bandura et al., 1977). A difference should be noted between outcome expectations and efficacy expectations. Outcome expectations are those that relate to a person's belief that a course of action will result in a given outcome (Bandura, 1977a). Efficacy expectations refer to the person's belief that they are able to conduct activities that comprise a course of action, regardless of outcome (Bandura, 1977a). Research supports the idea that levels of self-efficacy are directly related to a person's determination to deal with their health condition (Bandura, 1977a). Not only is self-efficacy associated with a person's likeliness to start a behavior, but is also linked to the likelihood that, once started, a course of action will be completed when faced with obstacles (Bandura, 1977a). Psychosocial programs have repeatedly been shown to affect outcomes when focusing on self-efficacy of the participant (Bandura, 1997). An increase of self-efficacy in one behavioral area, can extend to behaviors in other areas that are self-debilitating (Bandura et al., 1977;

Bandura, Jeffery, & Gajdos, 1975). This generalization of self-efficacy is greatest when applied to behaviors similar to those where self-efficacy was first gained (Bandura, Blanchard, & Ritter, 1969).

For an individual, self-efficacy can be increased in a variety of ways. The most common influences used to increase self-efficacy include vicarious experience, verbal persuasion, physiological states, and performance accomplishments (Bandura, 1977a). Vicarious experience occurs when the behavior and outcomes of another person are observed (Bandura, 1977a). The effect on self-efficacy by vicarious experience is less than if the person executed the behavior successfully themselves, rather than just observing the success of another (Bandura & Barab, 1973). Verbal persuasion occurs when suggestions are presented relating to the ability of the person to accomplish a given behavior. The effect of verbal persuasion on self-efficacy is lower than that witnessed with performance accomplishments; however the combination of verbal persuasion and performance accomplishments produce greater differences in self-efficacy than performance accomplishments alone (Bandura, 1977a). Performance accomplishments, using modeling, provide a skill that can later be used to combat stress and anxiety associated with a particular behavior (Bandura et al., 1977; Bandura et al., 1975).

The promotion of self-efficacy is often used in self-management programs due to its established success in influencing behavior (Lorig & Holman, 2003). Self-management relies on social learning and behavioral theories, which emphasize the person's abilities as an active learner in social contexts (Bandura et al., 1977). It is the interaction of skills, incentives, and efficacy that determine the ability of a person to engage in successful self-management (Bandura, 1977a). If a complete education program was presented to a patient, but the patient did not feel that they had any way of controlling or changing their condition (self-efficacy), they would not be able to properly self-manage their chronic disease (Bandura & Wood, 1989). In health promotion programs targeting self-management of disease, improved patient self-efficacy translates to improvement in health behavior, chronic disease outcomes, and ultimately quality of life (Kennedy et al., 2007; Griffiths et al., 2005; Barnason et al., 2003; Dallow & Anderson, 2003; Tsay, 2003; Brody et al., 2002; Kukafka et al., 2002; Aljasem, Peyrot, Wissow, & Rubin, 2002; Lorig et al., 2001; Warnecke et al., 2001; Bernal, Woolley, Schenaul, & Dickinson, 2000; Lorig et al., 1999; Goeppinger et al., 1989).

Medical Self-Management

Self-management is often defined as the daily activities a person engages in to maintain their health (Von, Gruman, Schaefer, Curry, & Wagner, 1997). Another definition, specific to chronic disease self-management, is to have the patient achieve the lowest level of symptoms and the highest level of functionality, while taking into consideration the severity of the disease (Clark, 2003). The literature shows that many of those suffering from a chronic disease are not able to manage their conditions, with African Americans and Hispanics reporting lower levels of self-efficacy than white, non-Hispanics (Bethell et al., 2001). Medical self-management plays a large role in optimizing health outcomes for persons with a single or multiple chronic diseases (Robert Wood Johnson Foundation, 2004; Clark, 2003; Lorig, Sobel, Ritter, Laurent, & Hobbs, 2001; Wagner et al., 2001; Glasgow, 1994).

According to reports from the Behavioral Risk Factor Surveillance Survey (BRFSS), two-thirds of those having a chronic disease report not being advised of behavior changes by their physician, and one-third feel they do not receive adequate information on proper self-management (Bethell et al., 2001).The barriers faced in self-management of a disease can negatively affect mortality, quality of life, and disease specific outcomes (Mancuso, Rincon, McCulloch, & Charlson, 2001; O'Connor, Crabtree, & Yanoshik, 1997; Parcel et al., 1994). Overcoming the barriers to self-management often result in improved health outcomes across a variety of chronic disease conditions (Rost, Nutting, Smith, Elliott, & Dickinson, 2002; Lorig et al., 2001; Greenfield, Kaplan, Ware, Jr., Yano, & Frank, 1988). Chronic disease self-management programs have been proven to increase self-efficacy, improve health status, and decrease hospitalizations (Goetzel et al., 2007; Ozminkowski et al., 2006; Chodosh et al., 2005; Wagner et al., 2001; Lorig et al., 1999). However, data shows an estimated 50% of practices with over 20 physicians do not offer self-management programs to clients with chronic disease (Casalino et al., 2003).

Chronic disease self-management, though placing a majority of the work on the patient, still involves working closely with family and necessary physicians (Redman, 2005). The patient is able to report on their body's response to a self-management program, which plays an integral role in its success (Bodenheimer et al., 2002; Lorig & Holman, 1993). The physician is able to offer the patient and the family knowledge about the disease and options for treatment. Studies have shown that the thoroughness of information given by a physician and the participatory decision-making style of a physician, have a significant influence on patient behavior and clinical outcomes (Heisler et al., 2003a; Bodenheimer et al., 2002; Heisler, Bouknight, Hayward, Smith, & Kerr, 2002; Stewart et al., 2000; Golin, DiMatteo, & Gelberg, 1996; Stewart, 1995; DiMatteo et al., 1993; Kaplan, Greenfield, & Ware, Jr., 1989). However, studies have found a distinct difference with regard to older adults. Though many people prefer to be involved in the decision-making process, older adults prefer to have their chronic condition explained in detail and have the doctor prescribe a self-management plan (Schulman-Green, Naik, Bradley, McCorkle, & Bogardus, 2006; Belcher, Fried, Agostini, & Tinetti, 2006; Levinson, Kao, Kuby, & Thisted, 2005; Golin et al., 2002; Mansell, Poses, Kazis, & Duefield, 2000; Arora & McHorney, 2000; Guadagnoli & Ward, 1998; Deber, Kraetschmer, & Irvine, 1996; Sherbourne, Hays, Ordway, DiMatteo, & Kravitz, 1992). When considering behaviorally complex lifestyle adjustments, older adults should play a central role in the decisions made (Heisler, Cole, Weir, Kerr, & Hayward, 2007). Family members can serve an important role as the intermediary between an objective understanding of self-management and the actual implementation of proper techniques by the patient (Heisler et al., 2007). Family is also able to act as a social support for the patient and encourage continued proper self-management (Heisler et al., 2007). Hispanic patients are more likely to feel inadequately involved in the decision making process with their physician (Bethell et al., 2001).

Self-Management Barriers

Barriers to self-management can be seen across the factors of age, sex, race, ethnicity, and culture (Daaleman, 2006; Jerant, von Friederichs-Fitzwater, & Moore, 2005; Karter, Ferrara, Darbinian, Ackerson, & Selby, 2000). Those who are younger than 50 years of age tend to suffer from a single chronic disease (Clark, 2003). In contrast, older adults are often faced with many diseases that they, or their caretakers, must learn to self-manage (Clark et al., 1991). Walsh and colleagues categorized the barriers of self-management into three topics: 1) primary access – medical insurance, healthcare cost, and accessibility to physicians and hospitals; 2) secondary access – transportation, following healthcare system rules, and access to special needs care; 3) tertiary access – language barriers, physician-patient relationship, culture, and personal beliefs (Walsh D'epiro, Betancourt, Johnson, & Valadez, 2000). The barriers faced in self-management of a disease can negatively affect mortality, quality of life, and disease specific outcomes (Mancuso et al., 2001; O'Connor et al., 1997; Parcel et al., 1994). Overcoming the barriers to self-management often result in improved health outcomes across a variety of chronic disease conditions (Rost et al., 2002; Lorig et al., 2001; Lorig et al., 1999; Greenfield et al., 1988).

External Barriers

External barriers to self-management consist of the those things outside of a person's direct control, such as age, gender, socioeconomic status, and surroundings of the patient, such as what resources are available from others and their community (Glasgow, 1994). Commonly cited external barriers to self-management are the unavailability of information, inadequacy of health insurance coverage, inability to access services and the lack of support, by the healthcare personal or at other levels of society (Loh, Packer, Yip, & Low, 2007; Bayliss, Ellis, & Steiner, 2007; Glasgow, 1994; Clark et al., 1991).

Medical Insurance

Of those with a chronic disease responding to the BRFSS, 7% report not having insurance (Bethell et al., 2001). Medicare is a federal health insurance that covers approximately 96% of non-institutionalized people over the age of 65 (US Department of

Health and Human Services, 2005). Medicare covers costs associated with acute health care, requiring about 50% of total health expenditures to be covered by other means (US Department of Health and Human Services, 2005). Figuring out a way to cover the expenses that Medicare does not is difficult due to private insurance coverage being hard to acquire (Jerant et al., 2005). The Medicare Prescription Drug Improvement and Modernization Act of 2003 aimed to improve care quality and reduce costs associated with chronic disease (Daaleman, 2006). Medication adherence is an important aspect of every self-management program, and has multiple barriers. Some of the barriers to medication adherence are cost and access (Jerant et al., 2005; Rubin, 2005; Piette, Wagner, Potter, & Schillinger, 2004; Zgibor & Simmons, 2002; Karter et al., 2000). Of the older adults using Medicare Part D, to cover prescription costs, in 2006-2007, 8%-9% reported being unable to get prescriptions because costs were still too high (National Center for Health Statistics, 2010). The burden of affordable medical care is disparate across ethnicities shown by rates of 19% for African Americans, 26% for Hispanics, and 16% for Whites (Bethell et al., 2001).

Access to Health Care Services

Those with a chronic disease report visiting a doctor 7.4 times per year on average, with 99% having a regular doctor and 94% having seen a doctor at least once in the past year (Bethell et al., 2001). Compared to other racial and ethnic groups, Hispanics are more likely to not have a regular doctor (Bethell et al., 2001). In a 2003 study by Bayliss and colleagues, results from personal interviews with 16 adults, having at least two or more chronic diseases, were evaluated for common barriers (Bayliss, Steiner, Fernald, Crane, & Main, 2003). Participants were asked, "Please list everything you can think of that affects your ability to care for your medical conditions" (Bayliss et al., 2003). One of the common responses was the logistics of obtaining health care services (Bayliss et al., 2003). Jerant et al., conducted a study using 10 focus groups, comprised of a total of 54 participants, having at least one chronic disease (Jerant et al., 2005). Participants in this study listed transportation issues as a significant barrier to self-management (Jerant et al., 2005). Patient-physician communication problems are often mentioned by patients as a barrier to self-management (Piette et al., 2004; Heisler et al., 2003b).

Community Resources

Community resources encompass many things, both tangible and intangible. A study by Dutton and colleges, in 2005, evaluating physical activity among African Americans with diabetes mellitus, highlighted the importance of adequate and appropriate space to exercise within a community (Dutton, Johnson, Whitehead, Bodenlos, & Brantley, 2005). In 2004, two studies highlighted the limited availability of fresh foods in communities (Horowitz, Colson, Hebert, & Lancaster, 2004; Rose & Richards, 2004). Horowitz and colleagues compared the availability of healthy, fresh foods in the neighborhoods of East Harlem and the Upper East Side of Manhattan (Horowitz et al., 2004). The study found that only 18% of stores in East Harlem stocked healthy, fresh foods compared to 58% in Upper East Side Manhattan (Horowitz et al., 2004). Rose and Richards conducted a secondary data analysis on a one-week food inventory using 963 participants in the Food Stamp Program (Rose & Richards, 2004). Analysis included the use of linear regression models for fruits and vegetables separately, and assessed variables including distance to store, travel time to store, ownership of a car, difficulty of supermarket access, and socioeconomic variables. Results showed significant associations between easy access to supermarkets and increased fruit consumption, and an inverse association with distance to store and fruit consumption (Rose & Richards, 2004).

Age-specific

While self-management techniques are similar across many disease types, older adults face different issues in chronic disease self-management compared to others (Clark et al., 1991). Inherent with aging, is a decline in general health most often due to multiple chronic diseases (Deimling, Bowman, & Wagner, 2007; Thome, Esbensen, Dykes, & Hallberg, 2004). Negative beliefs about aging, both by the individual and health care provider, can be a barrier to self-management (Yeom & Heidrich, 2009; Levy, 2003). These negative beliefs for the individual include the feeling that disease symptoms are a normal part of life (Dawson et al., 2005; Sarkisian, Hays, & Mangione, 2002) and also that new treatments will not be effective, resulting in avoidance of self-management behaviors (Miaskowski, 2000). Negative beliefs about older adults, by a healthcare provider, include the perception that older adults are resistant to trying new treatments and that an intervention would be ineffective (Ory, Kinney, Hawkins, Sanner, & Mockenhaupt, 2003; Miaskowski, 2000). A literature review by Clark and colleagues analyzed 70 publications addressing chronic disease and self-management (Clark et al., 1991). This review found that older adults experience barriers disproportionately than those who are younger than age 50, and the barriers faced are similar regardless of disease type (Clark et al., 1991). These barriers include lower health literacy, likelihood of a partner also suffering from a chronic disease, inherent physical limitations, fixed income, changing health status, and multiple chronic diseases (Clark et al., 1991). A field test study of a self-management education program for elderly heart patients identified the following as barriers to self-management: accepting physical limitations, following physician instructions, reading body signals, managing fear and anxiety, maintaining optimism, and keeping family members calm (Clark et al., 1988). Gerber and colleagues (2011) examined activation, the action of engaging in self-management of a disease at some level. The study had 275 participants, with inclusion criteria being age 65 or older and a physician-diagnosis of hypertension in New York state (Gerber et al., 2011). The study found that 60% of participants scored in the lowest rank on the Patient Activation Measure (PAM) (Hibbard, Mahoney, Stockard, & Tusler, 2005), signifying that they placed all management in the hands of their health care provider or lacked knowledge on self-management techniques (Gerber et al., 2011). Only 8% of the sample scored at the highest rank on the PAM, meaning that they were actively engaged in self-management (Gerber et al., 2011). An increase in age was associated with lower PAM scores (Gerber et al., 2011).

Race and Ethnicity

Race and ethnicity may present their own set of barriers to self-management. A secondary data analysis on the Diabetes Study of Northern California (DISTANCE), conducted by Lyles and colleagues in 2011, identified disparities perceived by patients (Lyles et al., 2011). The study sample consisted of 17,795 participants, of which 20% were Black, 23% Latino, 13% East Asian, 11% Filipino, and 27% White. Overall, 20% of participants reported discrimination in both health care and in general. Results showed that minorities reported greater discrimination in health care (ORs 2.0-2.9) compared to

Whites (Lyles et al., 2011). The Racial and Ethnic Approaches to Community Health across the United States (REACH U.S.) Risk Factor Survey is administered annually in minority communities, by the Centers for Disease Control and Prevention (CDC). Populations targeted in the survey include African Americans, Hispanics, Asians, and American Indians. A secondary data analysis, conducted by Liao and colleagues in 2011, compared 2009 data from REACH U.S. with data from the Behavioral Risk Factor Surveillance Survey (BRFSS) (Liao et al., 2011). Data from 28 communities in 17 states was collected, providing a sample of approximately 25,000 people. The study found that the majority of those in the minority populations had lower income levels, compared to the general population, did not see a doctor due to cost, and did not have health insurance. Compared to the general population, minorities had a higher prevalence of chronic disease and lower general health knowledge. Use of preventive services varied between minority populations, with Hispanics having the lowest use rates of cholesterol screening, and highest rates of uncontrolled hypertension and diabetes mellitus. The results from this study highlight the disparities suffered by minorities in access to health care and disease prevalence. Due to the variations seen between minority groups for a number of issues, different priorities and methods should be used when targeting each group (Liao et al., 2011). Minorities also face barriers to self-management due to personal beliefs and cultural values (Gallant, Spitze, & Grove, 2010). These are discussed in more detail in the section on internal barriers to self-management.

Socioeconomic status

Socioeconomic status has been observed to play a role in medical self-management (Zgibor & Songer, 2001; Freeborn, Pope, Davis, & Mullooly, 1997). In

2006, 8.8% of adults over the age of 55 years reported not seeking medical care due to cost, and 13.4% reported delaying medical care due to cost (National Center for Health Statistics, 2010). A literature review by Zgibor and Songer identified lower income levels as being strongly associated with lower utilization of physician services, lower use of preventive services, nonadherence to recommendations for self-management, and lower health literacy (Zgibor & Songer, 2001). A prospective follow-up study by Orchard and colleagues followed children diagnosed with Type-I diabetes from 1950 to 1980, with 407 of the participants completing a 10-year follow up exam (Orchard et al., 1990). Results of the study found that participants with lower income levels reported a greater number of perceived barriers to medical care, were less likely to seek care, and also less likely to carry health insurance. Participants with lower levels of education had lower health literacy rates and were less likely to participate in health promotion education programs (Orchard et al., 1990).

Internal Barriers

Internal barriers to self-management are those that are inherent, more readily changeable, and under control of the individual, such as psychological thoughts, physical and mental disabilities, and the ability to understand new self-management education offered to them by healthcare providers (Bodenheimer et al., 2002; Clark et al., 1991). Other internal barriers include a low emotional state, lack of knowledge regarding their disease state, personal beliefs, low self-efficacy, and the presence of multiple diseases (Bayliss et al., 2007; Chiang, Huang, & Chao, 2005; Jerant et al., 2005; Bayliss et al., 2003; Riegel & Carlson, 2002; Albright, Parchman, & Burge, 2001; Glasgow, Toobert, & Gillette, 2001; Lorig et al., 2001; Wdowik, Kendall, & Harris, 1997).

Health Literacy

Health literacy takes into account an individual's capacity to obtain, process, and understand health information that is required to make health decisions (U.S.Department of Health and Human Services, 2012). Limited health literacy is a large barrier to self-management (Sarkar, Fisher, & Schillinger, 2006), and is more prevalent among older adults and minority groups (U.S.Department of Health and Human Services, 2012). Among people having a limited health literacy, self-efficacy is a reliable determinant of self-management behaviors (Fisher et al., 2004; Kim, Love, Quistberg, & Shea, 2004; Nielson-Bohlman, Panzer, & Kindig, 2004; Chesla et al., 2003). Programs focusing on promoting self-management, while highlighting self-efficacy, have been proven effective among persons with limited health literacy (Gerber et al., 2005; Kim et al., 2004; Rothman et al., 2004a; Rothman et al., 2004b).

Even with programs in existence having proven positive effects, data shows that one-third of people in the United States do not receive adequate self-management training (Bethell et al., 2001). A literature review by Rothman and Wagner, found that a large number of patients with chronic diseases did not receive proper therapy, lack optimal disease control, and often lack self-management skills (Rothman & Wagner, 2003).

Comorbidities

Individuals with comorbidities face many of the same barriers to self-management as those with a single disease (Clark et al., 1991). Self-managing one chronic disease is difficult enough, and managing more than one presents its own specific barriers (Bayliss et al., 2007; Bayliss et al., 2003). Some of the barriers faced are lack of knowledge, financial issues, poor physician-patient communication, low self-efficacy, depression, lack of social support, and difficulty with medication (Jerant et al., 2005; Riegel & Carlson, 2002; Buetow, Goodyear-Smith, & Coster, 2000; Lansbury, 2000; Simmons et al., 1998; Wdowik et al., 1997). Results from the previously discussed 2003 study by Bayliss et al., showed the need for social and emotional support, issues related to physical limitations, and the aggravation of a condition as a direct result of treating another as being common barriers associated with managing multiple chronic diseases at the same time (Bayliss et al., 2003). A 2007 study by Bayliss and colleagues identified common barriers to older adults having multiple chronic conditions (Bayliss et al., 2007). The study used a cross-sectional design to conduct telephone surveys of 352 adults over the age of 65 having, at a minimum, physician-diagnosed diabetes, depression, and osteoarthritis. The majority of respondents were female and between the ages of 65 to 74 years old. The average number of chronic diseases was 8.7. Self-management barriers identified by the study included lower levels of physical functionality and compound effects of multiple chronic diseases (Bayliss et al., 2007). Common comorbidities that can act as barriers to the self-management of other diseases are depression and chronic pain (Krein, Heisler, Piette, Makki, & Kerr, 2005; Jerant et al., 2005; Regenstein, Huang, Schillinger, & et al, 2004).

Personal Beliefs and Cultural Values

Personal beliefs and cultural values can also act as barriers to self-management (Gallant et al., 2010). A literature review conducted by Gallant and colleagues identified trends and disparities in self-management of chronic disease among older adults (Gallant et al., 2010). The review found older adults held strong values for independence and self-reliance, which may lead to reluctance to ask for help and denial of the severity of a chronic disease. Older African American adults identified a high value on, and expectancy of, family support and a strong suspicion of medical researchers and the health care system in general. Hispanic older adults were found to believe responsibility of management for elders lies with extended family members. Women were identified as being expected to care for others, often at the expense of their own self-management. In turn, men expect their wives to see to their proper medical management, resulting in a lack of interest to seek knowledge and increase their own self-management skills. Overall, the study concludes that health promotion, and particularly self-management, programs should be culturally tailored (Gallant et al., 2010).

Attitudes

Attitude toward clinical diagnosis of a disease is also a concern since some patients encounter a mental barrier to acceptance of diagnosis (Wysocki, Greco, Harris, Bubb, & White, 2001). Without acceptance, the individual is unable to properly follow a self-management plan (Wysocki et al., 2001). A study by Chiang et al. in 2005, interviewed 227 parents of asthmatic children at two hospitals and identified the dislike of being labeled with a specific disease and lower self-perceived disease severity as barriers to successful self-management (Chiang et al., 2005). These attitude-based barriers to self-management can be overcome by increasing family cohesion, involvement, sharing of a common disease, and the creation of goals as a group (Chesla et al., 2004; Chesla et al., 2003; Wysocki et al., 2001; Samuel-Hodge et al., 2000; Pinhas-Hamiel et al., 1999).

Evidence-Based Health Promotion Programs

The CDC has published an online resource known as The Community Guide to provide quick and easy access to recommendations and findings regarding evidence-based public health programs (Centers for Disease Control and Prevention, 2011b). Created exclusively for evidence-based programs, The Community Guide is a valuable tool for research, grant writing, development and implementation of programs, education, and policies, and reinforces the growing trend towards using evidence-based health promotion programs. The term "evidence-based" refers to practices and programs that have been repeatedly proven to achieve desired results, most often in controlled trials (Tilford, 2000). Originally, the concept of deeming something as evidence-based was used in the field of medicine to identify the best practice and encourage its implementation (Speller, Wimbush, & Morgan, 2005). Although there has been a trend to use the evidence-base, there is no consensus on the amount of evidence needed or the most appropriate method of review to determine whether or not a program has earned the classifier of being evidence-based (Tilford, 2000). In the drive to classify programs as being evidence-based, preference has been given to results of systematic reviews and randomized controlled trials (Egger, Davey Smith, & Altman, 2001; Sackett, Rosenberg, Gray, Haynes, & Richardson, 1996). Randomized controlled trials are seen as an inappropriate research design for community-based health promotion programs since they do not take into account the complexities that exist in real-world implementation (Nutbeam, 1998; Speller, Learmonth, & Harrison, 1997; Black, 1996).

The use of controlled trials to evaluate whether or not a program is evidence-based leaves a gap of context-specific outcomes regarding the translation of programs in a community-based setting (Green, 2000). The drive to identify and implement evidence-based health promotion programs is to improve both quality and cost-effectiveness (Green, 2000). Implementing evidence-based programs in real-world settings, allows for programs to be refined in context and decreases the gap between theory and practice (Green, 2000). Delivering chronic disease self-management programs that are evidence-based to older adults, the largest segment of the population to suffer from chronic disease, can help prevent and control symptoms, resulting in improved quality of life and lower health care expenditures (Chodosh et al., 2005; Bodenheimer et al., 2002)

Chronic Disease Self-Management Program (CDSMP)

Design History

In designing CDSMP, Lorig and colleagues drew upon the history of self-management programs and theories to create the best possible program (Lorig & Holman, 2003; Clark et al., 1991). Prior to the development of CDSMP, most self-management programs were focused on dealing with a specific disease type (Warsi, Wang, LaValley, Avorn, & Solomon, 2004; Lorig & Holman, 2003). Drawing from experience with the Arthritis Self-Management Program, Dr. Lorig designed a program that was applicable for the self-management of any chronic disease (Lorig, Mazonson, & Holman, 1993; Lorig, Lubeck, Kraines, Seleznick, & Holman, 1985).

Due to the fact that patients with chronic disease are found to constantly shift focus back and forth from their disease and its symptoms to their general wellness (Patterson, 2001), the goal of self-management should be to shift this focus to mainly concentrate on wellness (Lorig & Holman, 2003). An effective way to accomplish this is to design a program that focuses on medical management, the maintenance or improvement of meaningful behaviors, and provide participants with the knowledge to control emotions associated with their chronic illness (Corbin & Strauss, 1988), but in the context of addressing problems that the participants consider important (Lorig & Holman, 2003). The content of CDSMP was identified and selected after conducting two needs assessments. The first was a literature review that identified 12 common tasks associated with self-management of chronic disease (Clark et al., 1991). These 12 tasks include recognizing and responding to symptoms, using medicine, managing emergencies, maintaining diet, maintaining adequate activity, smoking cessation, using relaxation techniques, interacting with health care providers, seeking information, adapting to work, managing relationships, and managing emotions (Clark et al., 1991). The second needs assessment included 11 focus groups that refined program content and the process of instruction (Lorig et al., 1996). The focus groups, conducted in various community settings, were made up of eight to 12 participants each and included both "well elders" and others affected with chronic disease at various stages (Lorig et al., 1996). Common themes identified from the focus groups included knowledge of disease causation, the effects of aging on both physical ability and emotions, the impact of chronic disease both physically and mentally, future concerns, and health service utilization (Lorig et al., 1996).

In a divergence from traditional health education programs that encourage improvements in compliance (Haynes, Taylor, & Sachett, 1979) and top-down tailoring (telling participants what actions should be taken) based on stage of change and health belief (Prochaska & DiClemente, 1986; Rosenstock, 1974), CDSMP encourages participants to self-tailor by providing the knowledge of what to do and the skill set and self-confidence to actually do it (Lorig & Holman, 2003). A report from the Robert Wood Johnson Foundation regarding self-management identified five fundamental self-management skills: problem solving, decision making, resource utilization, forming a partnership between the patient and the healthcare provider, and taking action (Center for the Advancement of Health, 2002). CDSMP addresses each of these skills, as well as others, during the six week program. In addressing problem solving, the skills of defining the problem, generating possible solutions, implementing the solutions, and evaluating the outcome are to be taught (D'Zurilla, 1986). Decision making requires that people have both adequate and accurate knowledge (D'Zurilla, 1986). Resource utilization involves people knowing about resources and being able to use the resources once found (Lorig & Holman, 2003). The relationship between patients and healthcare providers has changed over time and is different for English and Spanish-speaking members of the population (Lorig & Holman, 2003). Healthcare in the early 20th century focused on treating acute illness. However with people living longer due to improved care, chronic disease prevalence increased dramatically, changing the interaction roles between patient and physician to one of student and teacher (Lorig & Holman, 2003). A majority of Spanish-speaking patients found short office visits and referrals to a physical therapist or psychologist to be offensive (Lorig & Holman, 2003). The final skill, taking action, is synonymous with skill mastery from the theory of self-efficacy (Lorig, Holman, Sobel, & Laurent, 2006).

Each of the five skills listed above, as well as others in CDSMP, are addressed using the concept of self-efficacy. Both baseline self-efficacy levels and changes in self-efficacy impact a person's future health status (Lorig, Gonzalez, & Ritter, 1999; Bandura, 1997). A six month, randomized control study by Lorig et al., in 1999, evaluated 952 participants, over the age of 40 years, with a physician-confirmed chronic disease, using CDSMP (Lorig et al., 1999). At six months, treatment participants showed significant improvements compared to controls (Lorig et al., 1999). To improve self-efficacy, CDSMP uses performance mastery, modeling, interpretation of symptoms, and social persuasion (Lorig & Holman, 2003; Bandura, 1997). Skills mastery involves the active participation of individuals in their own behavior change. It is dealt with in the program by having participants create weekly action plans that are achievable (Lorig et al., 2006). CDSMP incorporates modeling through the use of peer instructors acting out a dialogue or having participants solve problems (Lorig et al., 1999). Symptom interpretation explains that symptoms have multiple causes, thereby encouraging program participants to try new and multiple management methods (Lorig & Holman, 2003). Social persuasion, a result of group dynamics, increases self-efficacy by allowing participants to observe the success and positive outcomes of others (Lorig & Holman, 2003).

Past Studies

Studies of CDSMP have shown that participants improve self-management behaviors and functional health outcomes (Kennedy et al., 2007; Swerissen et al., 2006; Griffiths et al., 2005; Farrell et al., 2004; Lorig, Ritter, & Gonzalez, 2003; Lorig et al., 2001; Lorig et al., 2001; Lorig et al., 1999). The success of CDSMP has shown that patients with differing chronic disease can be educated simultaneously, in contrast to a standing tradition of tailoring education programs to a specific disease type (Lorig et al., 1999).

Studies have shown that effective programs can be delivered that address general chronic disease self-management. Results from a randomized clinical trial of 952 participants over the age of 40 with the physician-confirmed chronic disease showed that, at six months following the final workshop, significant improvements were found in time spent performing stretching or strengthening exercises (Δ=13, SD=56.7, *p*=0.005), time spent performing aerobic exercise (Δ=16, SD=94.5, *p*<0.001) , cognitive symptom management (Δ=0.38, SD=0.77, *p*<0.001), communication with physicians (Δ=0.26, SD=0.98, p=0.006), self-reported health (Δ=-0.09, SD=0.72, *p*=0.02), health distress, fatigue (Δ=0.14, SD=0.79, *p*=0.003), disability (Δ=-0.02, SD=0.32, *p*=0.002), and social/role activities limitations (Δ=-0.07, SD=0.92, *p*<0.001) (Lorig et al., 1999). Significant differences were not found in pain/physical discomfort (Δ=-2.6, SD=19.4, *p*=0.27), shortness of breath (Δ=0.02, SD=0.87, *p*=0.56), or psychological well-being (Δ=0.09, SD=0.69, p=0.10) (Lorig et al., 1999). Results supported the idea that when delivered to a heterogeneous, chronic disease group, CDSMP is able to achieve improvements in health behaviors and health status (Lorig et al., 1999).

A longitudinal study, conducted by Lorig et al., in 2001, followed 831 participants of a randomized control trial of CDSMP with measurements at one and two year intervals (Lorig et al., 2001). At both years one and two, the number of emergency/outpatient visits (Δ=-0.689, SD=6.51, *p*=0.006 and Δ=-0.564, SD=6.22, *p*=0.036, respectively), health distress scores were reduced significantly (Δ=-0.199, SD=0.997, *p*<0.001 and Δ=-0.290, SD=1.02, *p*<0.001, respectively), and self-efficacy remained significantly improved (Δ=0.31, SD=1.67, *p*<0.001 and Δ=0.27, SD=1.78, *p*=0.009, respectively), compared to baseline values (Lorig et al., 2001). Improvements in self-efficacy at six months were associated with a reduction in health care utilization at one year (p=0.0203) (Lorig et al., 2001). The study concluded that CDSMP was a cost effective means of tertiary prevention for older adults with chronic disease due to its ability to improve measures of health status and reduce health care costs (Lorig et al., 2001).

CDSMP has been translated into a non-controlled setting through a partnership with Kaiser Permanente. An evaluation of the results was published by Lorig et al., in 2001. A total of 68 CDSMP workshops were delivered by Kaiser Permanente affiliates in 21 different sites across the United States. Participants were required to be at least 18 years old and have at least one chronic disease. A total of 703 people participated in the study with an average age of 62 years. Participants completed surveys at baseline and one year that evaluated health status factors, health behaviors, self-efficacy, and health care utilization. The study found small, but significant, improvements in health distress (Δ=-0.3, SD=1.2, p<0.001), social/role activity limitation (Δ=-0.02, SD=1.0, p<0.001), fatigue (Δ=-0.03, SD=2.4, p=0.002), pain (Δ=-0.3, SD=2.5, p=0.03), shortness of breath (Δ=-0.03, SD=2.5, p=0.003), self-efficacy (Δ=0.5, SD=2.4, p<0.001), and the health behaviors of time spent engaging in aerobic exercise (Δ=13, SD=97.3, p=0.01), cognitive symptom management (Δ=0.4, SD=0.9, p<0.001), and communication with a physician (Δ=0.2, SD=1.0, p<0.001). Improvements were seen in the health care utilization rates, during the previous six months, for physician visits (Δ=-0.4, SD=7.2, p=.19), hospitalizations (Δ=-0.1, SD=0.7, p=.14), days in hospital (Δ=-0.5, SD=7.3, p=.12), and emergency department visits (Δ=-0.1, SD=1.0, p<0.05) (Lorig et al., 2001). An improvement, though not significant, was seen for self-rated health (Δ=0.04, SD=0.8, p=0.20) (Lorig et al., 2001).

A small pilot study conducted in rural Tennessee by Farrell and colleagues, in 2004, evaluated outcomes of CDSMP participants at six weeks (Farrell et al., 2004). Participants were referred by primary care physicians at two health care clinic locations and completed one of the three CDSMP workshops offered. A total of 48 participants completed the study with an average age of 60 years. At six weeks, statistically significant improvements were seen in self-efficacy to manage symptoms (Δ=0.31, p=0.10), health self-efficacy (Δ=1.35, p=0.001), and cognitive symptom management (Δ=0.40, p=0.01). Improvements, while not significant, were seen in the health behaviors of time spent stretching or performing strengthening activity (Δ=0.15, p=0.25) and communication with a physician (Δ=0.21, p=0.25). The study concluded that CDSMP is an effective component of self-management and appropriate for use in rural Tennessee (Farrell et al., 2004).

A 2005 study by Lorig and colleagues delivered CDSMP to 124 participants, two-thirds of whom had type-II diabetes, in Texas, New Mexico, and Chihuahua, Mexico (Lorig et al., 2005). Participant outcomes were assessed at four months. At four months, the study found significant improvements in communication with physician (Δ=-0.35, SD=0.35, p=0.002), self-reported health (Δ=-0.33, SD=.90, p=0.001), health distress (Δ=-0.47, SD=1.05, p<0.0001), shortness of breath (Δ=-0.57, SD=2.52, p=0.24), social/role activity limitations (Δ=-0.30, SD=1.05, p=0.005), self-efficacy (Δ=0.64, SD=2.66, p=0.17), and time spent performing aerobic activities (Δ=26.8, SD=94.1, p=0.005) (Lorig et al., 2005).

Tomando Control de su Salud (TCDS)

As previously discussed, Tomando Control de su Salud (TCDS) is not a direct translation of CDSMP due to research suggesting that desired outcomes were not being realized among Hispanic participants (Lorig et al., 2003). Further research by program developers identified trends affecting Hispanics. These trends included an increasing health disparity between Hispanics and non-Hispanics, an increase in chronic disease prevalence and comorbidity, and the fact that one-third of Hispanics lacked health insurance (Lorig et al., 2003). Based on previous trials, TCDS was modified to emphasize self-efficacy through skills mastery, modeling, reinterpretation of symptoms, and social persuasion (Lorig et al., 2003). This emphasis on self-efficacy was supported by a previous study linking self-efficacy to the psychological well-being of Latinas suffering from a chronic disease (Abraido-Lanza, 1997). TCDS differs from CDSMP by focusing class activities on nutrition, food selection, food preparation, and menu planning (Gonzalez et al., 2002).

Past Studies

A randomized control community-based trial for TCDS was conducted by Lorig and colleagues in 2003, in northern California (Lorig et al., 2003). A total of 551 participants, all speaking Spanish and the majority being from Mexico, and having at least one chronic disease were enrolled in the study. Participants selected for the intervention group (n = 327) attended a TCDS workshop right away, and those in the control group (n = 224) attended a TCDS workshop at four months. Surveys were completed at baseline, four months, and one year from date of study enrollment. Differences between treatment and control groups were assed at four months, with results showing statistically significant improvements over baseline for self-reported health (Δ=-0.48, p<0.0001), self-efficacy (Δ=0.16, p=0.0006), health distress (Δ=-0.47, p<0.0001), and communication with physician (Δ=0.34, p<0.0001). At one year, statistically significant improvements were seen for self-efficacy (Δ=1.17, SD=3.10, p<0.0001), self-reported health (Δ=-0.28, SD=.94, p<0.0001), health distress (Δ=-0.79, SD=1.52, p<0.0001), and communication with physician (Δ=0.73, SD=1.68, p<0.0001) compared to baseline values (Lorig et al., 2003).

Lorig and colleagues conducted a translational study of TCDS along the borders of Texas and New Mexico with Mexico (Lorig et al., 2005). Over the course of 30 months, a total of 31 workshops were delivered in multiple sites. A total of 319 participants over the age of 18, having at least one chronic disease, were recruited by word of mouth and media advertisements. The study compared four month and one year outcomes with baseline values. At four months, participants showed statistically significant improvements in social/role activity limitation (Δ=-0.38, SD=1.14, *p*<0.0001), self-reported health (Δ=-0.20, SD=.83, *p*=0.001), health distress (Δ=-0.85, SD=1.29, *p*<0.0001), self-efficacy (Δ=1.76, SD=3.04, *p*<0.0001), and time spent performing aerobic activities (Δ=47.4, SD=144, *p*<0.0001) (Lorig et al., 2005). At one year, participants showed statistically significant improvements over baseline scores for aerobic activity (Δ=22.8, SD=146, *p*<0.0001), social/role activity limitations (Δ=-0.39, SD=1.10, *p*=0.024), health distress (Δ=-0.83, SD=1.40, *p*<0.0001), and self-efficacy (Δ=1.17, SD=3.00, *p*<0.0001) (Lorig et al., 2005).

Self-Management Education Programs: Implementation

Both CDSMP and TCDS are designed to be delivered by lay-leaders, or peers, of those participating in the program (Lorig et al., 2003; Lorig et al., 1999; Lorig et al., 1986). Research has shown peer instructors, when trained and provided with a protocol are able to teach as well, if not better, than health professionals (Lorig et al., 2001; Cohen, Sauter, deVellis, & deVellis, 1986; Lorig et al., 1986). Self-management education programs often rely on community instructors for dissemination (Gitlin et al., 2008). Due to this, it is very important that certain requirements be achieved at the community level for those participating to get the greatest effect from the program (Harvey et al., 2008). Programs where community members actively participate in dissemination and implementation are more likely to result in improved health outcomes (Harvey et al., 2008; Scott, 2001). A crucial component to improving health outcomes is participation from the public (McMurrary, 2003). Program facilitators must be able to show that they are committed, have the ability to build trust, and that they are knowledgeable about the target population (Gitlin et al., 2008). The staff should believe in the value of the program they are implementing and follow the implementation procedure exactly as it is prescribed (Gitlin et al., 2008). The agency delivering the program must have the space and funding to offer the program as intended, as well as the means to market the program to the community (Gitlin et al., 2008).

Fidelity

In general, the concept of fidelity is concerned with the degree to which a program is implemented as it was intended (Cross & West, 2011). A consensus on a single definition for fidelity does not exist (Frank, Coviak, Healy, Belza, & Casado, 2008; Durlak & DuPre, 2008; Forgatch, Patterson, & Degarmo, 2005; Dusenbury, Brannigan, Falco, & Hansen, 2003), as it can refer to the strict adherence with the prescribed delivery, or allow for adaptation to the community where it is being implemented (Hill, Maucione, & Hood, 2007; Ringwalt et al., 2003; Backer, 2002). Fidelity, for this project, is defined as how well the instructor delivers the program content as specified in the instructor manual (Frank et al., 2008; Perepletchikova & Kazdin, 2005; Flannery-Schroeder, 2005). Fidelity is a crucial component regarding the translation from controlled trials to community-based implementation (Frank et al., 2008; Forgatch et al., 2005). Not only does fidelity concern the delivery of a program's key elements, but also the training of instructors (Frank et al., 2008; Forgatch et al., 2005). A program that is evidence-based, when not delivered as intended, may result in the desired and expected outcomes not being realized (Cross & West, 2011; Frank et al., 2008; Bumbarger & Perkins, 2008). Fidelity is evaluated through a process called fidelity monitoring (Forgatch et al., 2005). Fidelity monitoring is often conducted through in-field visits by trained observers using a standardized form (Poduska et al., 2009; Frank et al., 2008). Fidelity monitoring itself may alter program delivery (Frank et al., 2008). The best way to maintain program fidelity is to make it an integral part of the program itself, where fidelity monitoring is treated as a means of continuous quality improvement (Frank et al., 2008).

Process Evaluation

In 2005, Lorig and colleagues published a process evaluation study for the three year, nationwide dissemination of CDSMP through affiliates of Kaiser Permanente (Lorig, Hurwicz, Sobel, Hobbs, & Ritter, 2005). Of the 12 Kaiser Permanente regions across the United States, a total of 8 participated in a program to deliver CDSMP to patients. Funding for the nationwide dissemination of CDSMP only included research costs, initial trainings, and a national program coordinator. Each region and site were responsible for funding the implementation and delivery of CDSMP. Representatives for each region attended a CDSMP master-training session, and then returned to their regions to teach CDSMP workshops and train peer leaders. Regional managers were invited to discuss their experiences through email and during a monthly conference call. Telephone interviews were conducted at one-year and two-years with a total of 225 regional health education directors, regional coordinators, site coordinators, master trainers, and peer leaders. Results showed that six of the eight participating regions found the design of CDSMP helpful in implementation, and thought the length of the program, as well as class session length, were acceptable. Lack of organizational support in the areas of administration, physicians, and nursing staff was identified as a major barrier to implementation. One of the largest barriers to implementation was the recruitment of participants. It was reported that potential participants and physicians recommending the program thought it might redundant with other disease-specific chronic disease programs. Another problem identified was the recruitment and maintenance of master trainers. Only 26% of master trainers considered their compensation to be "fair." Recruitment and retention of peer leaders was also difficult. Only 20% of peer leaders said they would be willing to teach again, and 55% though their pay of $110 for a six week workshop to be inadequate. Peer leaders also requested refresher trainings and addition role-playing exercises at training sessions. Fidelity monitoring was conducted periodically by site coordinators and was found to be high for both content and delivery. Overall the study found that CDSMP can be disseminated successfully within a large health care organization. Of the four regions that did not successfully implement CDSMP, the common and overreaching factor was organizational issues (Lorig et al., 2005).

Cost Burden and Benefit

For the United States, 80% of those over the age of 65 have at least one chronic disease (National Center for Chronic Disease Prevention and Health Promotion, 2011) with treatment accounting for approximately 70% of health care costs for seniors (Partnership for Solutions, 2004; Hoffman et al., 1996). For a person with at least one chronic disease, lifetime health care costs are five times greater when compared to a person without a chronic disease (Partnership for Solutions, 2004). Previously discussed CDSMP studies have also evaluated the cost savings resulting from the program by assessing the difference in health care utilization from baseline, and its correlation with health status. Considering a delivery cost range of $70-$200 per participant to offer CDSMP, the net savings at six months was found to be $750 (Lorig et al., 1999), and at 12 months between $790 (Lorig et al., 2001) and $990 (Lorig et al., 2001). At the two-year mark, the health care savings was found to be $390-$520 (Lorig et al., 2001). The decrease in savings at the longer term, compared to short-term, was attributed to a natural increase in disability that accompanies aging and chronic disease progression (Lorig et al., 2001). One study that looked at healthcare cost differences between those in a physical activity program, compared to those who were not, found an average healthcare savings of $1,200 per year if the participants completed the program (Ackermann et al., 2008). A recent study found that the best way to reduce health care costs was through a combination of insurance coverage, timely health care, and education on healthier behavior. All three combined provide an estimated reduction in costs by 30% after 10 years and 62% after 25 years (Milstein, Homer, Briss, Burton, & Pechacek, 2011).

Correlates of Completion of a Chronic Disease Self-Management Program

Attrition is a serious concern for researchers, as high rates may introduce a sampling bias (Jancey et al., 2007; Cunningham-Williams et al., 1999; Hough, Tarke, Renker, Shields, & Glatstein, 1996). The facts that certain demographic and psychosocial factors can predict the likelihood that an enrolled participant will meet the completion requirements of a health education intervention have been well documented (Merrill, Bowden, & Aldana, 2010; Radler & Ryff, 2010; Obasanjo & Kumwenda, 2009; Winslow, Bonds, Wolchik, Sandler, & Braver, 2009; Jancey et al., 2007; Honas, Early, Frederickson, & O'Brien, 2003; Vanable, Carey, Carey, & Maisto, 2002; Frack, Woodruff, Candelaria, & Elder, 1997). Knowing these factors can help program designers accommodate them so that fewer people will be lost to attrition. Also, program managers and class instructors can make extra efforts to ensure that participants have a better chance of completing the program. In turn, this will help the organization offering the program utilize resources more efficiently and make the largest impact possible in the target population.

The most common factors that can predict the likelihood of health promotion program completion include age (Honas et al., 2003; Vanable et al., 2002; Frack et al., 1997), socioeconomic status (Radler & Ryff, 2010; Jancey et al., 2007), level of education (Radler & Ryff, 2010; Winslow et al., 2009; Obasanjo & Kumwenda, 2009), race (Radler & Ryff, 2010), gender (Radler & Ryff, 2010; Frack et al., 1997), marital status (Radler & Ryff, 2010), health status (Radler & Ryff, 2010; Merrill et al., 2010; Jancey et al., 2007), and self-efficacy (Jancey et al., 2007).

Age

A number of studies have found that participants of a younger age, compared to the sample, are more likely to be lost to attrition (Honas et al., 2003; Vanable et al., 2002; Frack et al., 1997). Honas and colleagues conducted a study that followed 866 participants in a clinic-based weight loss program, with retention rates measured at eight and 16 weeks (Honas et al., 2003). At 16 weeks, the retention rate was 69%. Results from the study showed that participants younger than 50 years old were significantly associated with dropping out (OR = 1.39, CI = 1.02 - 1.90) (Honas et al., 2003). Frack and colleagues conducted a longitudinal study on Latino participants in a nutrition-oriented cardiovascular disease prevention program (Frack et al., 1997). The study found that younger participants were more likely to not complete the program (Frack et al., 1997). Similarly, a study by Vanable and colleagues analyzed participant attrition in a health promotion program targeting psychiatric outpatients (Vanable et al., 2002). A total of 601 participants started the program, with 69% completing the program. One factor associated with study completion included older age (Wald $\chi^2 = 9.24$, AOR = 1.03, CI = 1.01-1.05, $p < 0.003$) (Vanable et al., 2002). This discrepancy seen in completion rates based on age has been attributed to younger individuals placing other social activities at higher priorities and having a lower perceived benefit from health promotion programs (Frack et al., 1997).

Self-efficacy

Evidence has shown that low self-efficacy is associated with program attrition as participants may not feel capable of implementing the skills being taught (Jancey et al., 2007; McAuley, 1993). A study by Jancey and colleagues studied attrition rates for 248 sedentary, older adults enrolled in a six month physical activity intervention and had an attrition rate of 35% (Jancey et al., 2007). The study found a significant difference ($p < 0.01$) between the mean self-efficacy scores for completers and non-completers, with non-completers having lower self-efficacy scores (Jancey et al., 2007). In a study by McAuley and colleagues, 82 older adults were enrolled in a 20-week exercise program and then evaluated for long-term exercise maintenance at nine months (McAuley, 1993). Only 44 participants completed the nine-month follow up, resulting in an attrition rate of 54%. The study found self-efficacy to be a significant predictor of program completion ($R^2 = .112$, $p < 0.05$) (McAuley, 1993).

Socioeconomic Status

Lower socioeconomic status is associated with program attrition and is thought to be caused by the extra mental and physical demands that accompany this situation (Jancey et al., 2007; Frack et al., 1997). The study by Jancey and colleagues, described earlier, found lower socioeconomic status to be associated with program attrition (Jancey et al., 2007). With low socioeconomic status as the reference category, participants in the medium category (OR = .74, CI = .37-1.47) and high category (OR = .40, CI = .19-.83, $p < .05$) were less likely to leave the program at nine months (Jancey et al., 2007). The previously discussed study by Frack and colleagues (1997) found participants with lower socioeconomic status to be less likely to complete the program ($\chi^2 = 4.57, p < .01$) (Frack et al., 1997).

A study by Warren-Findlow and colleagues (2003), analyzed attrition rates for 203 older adults, with multiple chronic diseases, enrolled in a group-based exercise program meeting twice a week for 45 minutes of exercise and 15 minutes of health education over the course of 2.5 years (Warren-Findlow, Prohaska, & Freedman, 2003). The attrition rate at three months was 21% and at one year was 30%. The study found lower education level to be a significant predictor of attrition at three months ($p < .01$) and at one year ($p < .05$) (Warren-Findlow et al., 2003).

Physical Health

Physical health, as a factor contributing to attrition, has been identified as being both significant by some researchers (Merrill et al., 2010; Greaney, Lees, Nigg, Saunders, & Clark, 2006; Warren-Findlow et al., 2003; Lorig et al., 2001; Prohaska, Peters, & Warren, 2000) and not significant by others (Lorig et al., 2005; Frack et al., 1997).

In a previously discussed study by Warren-Findlow and colleagues, participants with fair/poor health were less likely to complete the program at three months ($\chi^2 = 5.51$, $p = 0.018$), but did not find any association regarding number of chronic diseases (Warren-Findlow et al., 2003). Warren-Findlow and colleagues also found functional status to be associated with program attrition for both participants dropping out at three months ($\chi^2 = 3.85, p = 0.048$) and at one year ($\chi^2 = 14.92, p < .000$). A study by Merrill and colleagues followed a cohort of 6,129 company employees enrolled in a telephone health coaching program. This study found that health status was significantly related with program attrition at 12 months ($p < .001$). Compared to participants rating their health as very good, those rating their health as good (AOR = 1.3, CI = 1.1-1.4), average (AOR = 1.4, CI = 1.2-1.7), and poor (AOR = 1.4, CI = 0.9-2.0) were less likely to complete the program (Merrill et al., 2010).

A study by Greaney and colleagues assessed the retention and recruitment of 1,277 older adults in the SENIOR project (Greaney et al., 2006). Participants were randomly assigned to one of four intervention groups with the common desired outcome being increased consumption of fruits and vegetables and increased physical activity. The intervention lasted 12 months and included printed material, tailored instruction, ongoing reports, and in-person interviews. The attrition rate at 12 months was 80.5%. At 12 months, participants who rated their health at baseline as fair/poor were significantly less likely to complete the program than those rating their health as good, very good, or excellent ($p < 0.01$) (Greaney et al., 2006).

Race and Ethnicity

Frack and colleagues (1997) investigated the compliance for 338 Latinos participating in a lecture based cardiovascular disease prevention intervention at six months. The study found that Hispanic participants were more likely to be lost to follow-up if they were male ($\chi^2 = 6.07, p < .05$), of lower socioeconomic status ($\chi^2 = 4.57, p < .01$), younger ($\chi^2 = 2.47, p > .05$), and less physically active ($\chi^2 = 8.19, p < .05$) (Frack et al., 1997). However, no association was seen between physical health and attrition for Hispanics (Frack et al., 1997). Previously described studies by Warren-Findlow and colleagues (2003) and Greaney and colleagues (2006) ($p = 0.76$), found no association between race and program completion. Reasons for attrition by minority groups may include cultural mistrust, feeling disenfranchised, limited representation of minority groups amongst intervention staff, and transportation difficulties (Langford et al., 2010; Brooks et al., 2008).

Time since Diagnosis

One factor found to be favorable of program completion includes having received a recent diagnosis of a new condition (Vanable et al., 2002). At this stage, a person is likely to be seeking information and has reason to take action (Vanable et al., 2002). In a previously discussed study by Vanable and colleagues (2002), one factor associated with study completion included a recent disease diagnosis (Wald $\chi^2 = 4.02$, AOR = 2.61, CI = 1.02-6.68, $p < 0.05$) (Vanable et al., 2002).

Past CDSMP/TCDS Studies

No studies currently exist predicting the likelihood of participant completion for the six week group education component of CDSMP or TCDS; however, there are studies that highlight the differences between completers and non-completers. A study by Lorig and colleagues (2005) evaluated attrition rates for 123 CDSMP participants and 322 TCDS participants (Lorig et al., 2005). No differences in demographic factors and baseline measures were found to be statistically significant between program completers and non-completers at four months and again at one year (Lorig et al., 2005). Another study of TCDS by Lorig and colleagues (2003) followed 551 participants for one year (Lorig et al., 2003). The only significant difference between completers and non-completers at one year was level of self-efficacy ($p < 0.05$), with a higher level being associated with program completion (Lorig et al., 2003).

A study by Lorig and colleagues in 2001, followed 831 participants, age 40 and over with at least one chronic condition for two years. Follow-up surveys were administered at one year at two years with completion rates of 82% and 76%, respectively (Lorig et al., 2001). The only demographic factor found to be significantly different between completers and non-completers was education level ($p < 0.01$), and this was only at two-years (Lorig et al., 2001). At one year the psychosocial factors, collected at baseline, of self-rated health ($p < 0.001$), disability ($p < 0.01$), social/role activity limitation ($p < 0.001$), energy/fatigue ($p < 0.001$), health distress ($p < 0.001$), and self-efficacy ($p < 0.001$) were found to be significantly different between groups. At two years, the psychosocial factors of self-rated health ($p < 0.05$), disability ($p < 0.05$), social/role activity limitation ($p < 0.01$), energy/fatigue ($p < 0.05$), and health distress ($p < 0.01$) were found to be significantly different between groups (Lorig et al., 2001).

Conclusion

The population of the United States is rapidly aging, with those over the age of 65 expected to double by the year 2030 (US Department of Health and Human Services, 2005). Older adults are more likely to experience chronic disease, as shown by the fact that 80% of those over the age of 65 have at least one chronic disease (National Center for Chronic Disease Prevention and Health Promotion, 2011), 75% have more than one (Agency for Healthcare Research and Quality, 2008), and 33% have three or more (Partnership for Solutions, 2004). Proper self-management of chronic disease can lead to increased quality of life, reduced health care expenditures, and improved health behavior (Goetzel et al., 2007; Ozminkowski et al., 2006; Chodosh et al., 2005; Wagner et al., 2001; Lorig et al., 1999). One evidence-based health promotion program targeting older adults with chronic disease is CDSMP, and its Spanish-language counterpart TCDS. These programs focus on improving self-efficacy to manage disease by teaching participants skills in symptom management, problem solving, and utilization of available resources. Attending all six sessions of CDSMP or TCDS is crucial to realizing the desired outcomes. However, some participants do not complete the program. Common factors associated with attrition from health promotion programs include age (Honas et al., 2003; Vanable et al., 2002; Frack et al., 1997), socioeconomic status (Radler & Ryff, 2010; Jancey et al., 2007), level of education (Radler & Ryff, 2010; Winslow et al., 2009; Obasanjo & Kumwenda, 2009), race (Radler & Ryff, 2010), gender (Radler & Ryff, 2010; Frack et al., 1997), marital status (Radler & Ryff, 2010), health status (Radler & Ryff, 2010; Merrill et al., 2010; Jancey et al., 2007), and self-efficacy (Jancey et al., 2007). Knowledge of and the degree to which these factors affect participant attrition in CDSMP and TCDS would provide staff implementing the programs the opportunity to target these participants once enrolled in order to decrease their likelihood of attrition.

Chapter 3

Manuscript 1: Intermediate Outcomes of CDSMP Offered by Members of the Healthy Aging Regional Collaborative in South Florida

Introduction

It is projected that by 2050, there will be 88.5 million older adults in the United States (U.S.Census Bureau, 2010). Of those currently over the age of 65, approximately 80% have at least one chronic disease (National Center for Chronic Disease Prevention and Health Promotion, 2011). The most common chronic diseases among older adults include hypertension, heart disease, diabetes mellitus, cancer, arthritis, and respiratory illnesses, such as asthma, emphysema, and chronic obstructive pulmonary disease (Hung, Ross, Boockvar, & Siu, 2011; National Center for Health Statistics, 2010). Chronic disease is also responsible for limiting activities and impacting mobility (National Center for Health Statistics, 2010). For all adults over the age of 65, 35% report having limited activity due to disease, with the most common chronic diseases limiting activity being arthritis and cardiovascular conditions (National Center for Health Statistics, 2010).

Once diagnosed with a chronic disease, individuals are more likely to develop additional chronic diseases (Tucker-Seeley, Li, Sorensen, & Subramanian, 2011; National Heart Lung and Blood Institute, 2008), and the majority of older adults manage two or more chronic diseases simultaneously (Wolff, Starfield, & Anderson, 2002). Currently, 33% of older adults have three or more chronic diseases (Partnership for Solutions, 2004). A report from the Robert Wood Johnson Foundation found that Americans with chronic disease are twice as likely to rate their health as poor or fair and twice as likely to report having a "bad day" (Bethell, Lansky, & Fiorillo, 2001).

Compared to the general population, where 56% describe their overall health as excellent or very good, only 25% of those with chronic disease reported their health as excellent or very good (Bethell et al., 2001).

Due to the prevalence of chronic disease, an emphasis has been placed on educating the individual so that they are then able to self-manage their condition (Funnell, 2010; McDonald, Rogers, & Macdonald, 2008; Grey, Knafl, & McCorkle, 2006; Institute of Medicine Committee on Health Care in America, 2001; Holman & Lorig, 2000; Norburn et al., 1995). The ultimate goal of self-management is to either improve current health status or prevent further disability by controlling existing symptoms (Bell & Orpin, 2006; Creer, Holroyd, Glasgow, & Smith, 2004). Other aspects of self-management programs often include physical symptom management, improved independence, and increased quality of life (Kennedy, Hopwood, & Duff, 2001). A large number of educational programs promoting self-management have been developed, and are available for many different chronic conditions (Lorig & Holman, 2003). However not all programs have been proven to be effective in providing the desired results consistently (Chodosh et al., 2005). Delivering chronic disease self-management programs that are evidence-based to older adults, the largest segment of the population to suffer from chronic disease can help prevent and control symptoms, resulting in improved quality of life and lower health care expenditures (Chodosh et al., 2005; Bodenheimer, Lorig, Holman, & Grumbach, 2002).

The Chronic Disease Self-Management Program (CDSMP) was developed and evaluated by Kate Lorig and colleagues, and is considered an evidence-based program (Lorig et al., 1999). CDSMP has been proven to be effective in achieving significant, long-term, improvements in patient self-efficacy, health behavior, social/role limitations, health care utilization, and chronic disease symptoms in randomized control trials (Lorig, Ritter, & Jacquez, 2005; Lorig et al., 2001; Lorig et al., 1999) and a "real-world" implementation in Kaiser Permanente clinics (Lorig, Sobel, Ritter, Laurent, & Hobbs, 2001).

Improving self-efficacy is a key component and goal of CDSMP. While many people diagnosed with a chronic disease know the changes that they need to make, many fail to implement those changes due to low self-efficacy (Farrell, Wicks, & Martin, 2004). Multiple studies have shown both baseline self-efficacy levels and changes in self-efficacy impact a person's future health status (Lorig, Gonzalez, & Ritter, 1999; Bandura, 1997). To improve self-efficacy, CDSMP uses performance mastery, modeling, interpretation of symptoms, and social persuasion (Bandura, 1997). Taking action is synonymous with skill mastery from the theory of self-efficacy (Lorig, Holman, Sobel, & Laurent, 2006). In a divergence from traditional health education programs that encourage improvements in compliance (Haynes, Taylor, & Sachett, 1979) and top-down tailoring based on stage of change and health belief (Prochaska & DiClemente, 1986; Rosenstock, 1974), CDSMP encourages participants to self-tailor by providing the knowledge of what to do and the skill set and self-confidence to actually do it (Lorig & Holman, 2003).

According to the 2000 US Census, there are an estimated 635,000 older adults in South Florida (U.S.Census Bureau, 2000). Knowing of the high prevalence of older adults in South Florida, the Health Foundation of South Florida (HFSF) instituted the Healthy Aging Regional Collaborative (HARC) to offer evidence-based health promotion programs to older adults through community agencies in South Florida. The target population of the HARC included older adults of Broward, Miami-Dade, and Monroe Counties. CDSMP was the evidence-based health promotion program chosen by HARC leaders to address chronic disease in the older adult population of South Florida.

The purpose of this investigation was to evaluate whether a chronic disease self-management program, when implemented by multiple, community-based, agencies through a large-scale collaborative effort in South Florida, can increase self-efficacy regarding multiple aspects of chronic disease management, decrease social activity/role limitations, and increase time spent exercising. Given that there is limited information about translating CDSMP to practice settings by community agencies, in a collaborative effort, this study focused on assessing program outcomes. It was hypothesized that at the end of program instruction, six weeks, program participants will show significant improvements over baseline scores for self-efficacy, social activity limitations, and time spent exercising.

Methods

Setting and Participants

From 10/01/2008 through 12/31/2010, the HFSF funded a total of seven agencies which offered 108 CDSMP workshops throughout Broward, Miami-Dade, and Monroe Counties, at 81 sites. The types of agencies offering CDSMP included five community service agencies/health clinics targeting older adults, one hospital, and one county-level Elderly and Veterans Affairs department. CDSMP workshops were offered in community centers, churches, nursing homes, residential community clubhouses, and health clinics.

Agencies offering the program recruited participants from both their existing client base and the community through fliers, commercial advertisement, and word of mouth. The target population consisted of adults who were aged 55 years or older and had at least one self-reported chronic disease. For the purpose of this study, participants were excluded from analysis if age was missing or younger than 55 and no chronic disease was reported.

Training and Fidelity Monitoring

Workshop instructors received a four-day (20 hour), program-specific, training and were paired with an experienced instructor for their first workshop (Stanford Patient Education Research Center, 1993). Instructors were either health care professionals or peers with experience managing a chronic disease. Random fidelity monitoring was conducted to identify instructors who were not delivering the program as intended. Using the proposed number of workshops, a random selection process was used to identify 30% of workshops for each agency. A random number generator was then used to identify which of the six program sessions, excluding session one, was to be observed for fidelity. Program managers were given at least one week's notice prior to a fidelity observation. Fidelity monitoring was conducted on 25% (n = 27) of all workshops offered and included the evaluation of the site where the workshop was held, the environment of the classroom, the interaction between instructors and participants, and program content and delivery.

Intervention

Classes lasting two-and-a-half hours were offered once a week for a total duration of six weeks. Each workshop was led by two instructors who followed the presentation order and scripts laid out in the Leader's Manual. The recommended average class size is 12-15 participants with a minimum of six and a maximum of 20 (Stanford Patient Education Research Center, 1993). Program managers at each agency were instructed to not begin a workshop unless a minimum of eight participants had enrolled, which ensured adequate social interaction as required by CDSMP. Using lectures, brainstorming, and role play participants are taught skills to problem solve, manage common disease symptoms, utilize available resources, and to think critically (Lorig et al., 1999).

Data Collection

Prior to the start of the first session, all participants were asked to complete a demographic and first session survey. At the end of the final session, at six-weeks, participants were asked to complete a last session survey that included questions from the first session survey. Surveys were administered by workshop instructors and, at times, staff of the delivering agency to offer assistance in clarifying questions, reading questions, and writing responses for those participants who were unable to do so. Following the last session of the workshop, staff of the agency delivering CDSMP entered participant data into an online database. Data collection forms were then mailed to an evaluation team hired by the HARC that verified data entry.

Measures

This study used measures consistent with other CDSMP evaluations to allow for comparison. Outcome measures were chosen to evaluate self-efficacy, health status, and health behavior. Some measures were modified to decrease the length of the surveys at baseline and week six. Detailed examples of the questions used at baseline and week six are displayed in Table A.1.

Health Status

Self-rated health was measured using a single-item scale adopted from *The National Health Interview Survey* (National Center for Health Statistics, 1991). The self-rated health measure has a previously reported test-retest reliability of .92 (Lorig et al., 1996). Lorig and colleagues validated this measure by assessing correlation values between it and other health status measures. Correlation values ranged from .28-.46 (Lorig et al., 1996).

Participants were also asked to rate their level of pain, fatigue, shortness of breath, and frustration in the previous two weeks using a modified visual-numeric scale having 10 histograms of different heights and shading intensities. Using the question regarding level of pain, the scale was assessed for reliability and validity in the Spanish Arthritis Self-Management Study which found a test-retest reliability of .64, and a correlation value of .72 with the original version of the pain question (Lorig et al., 1996; Gonzalez, Stewart, Ritter, & Lorig, 1995). Tests for validity and reliability have not been previously reported for use of the scale in English, nor for fatigue, shortness of breath, and frustration. Participants also reported the number of days, out of the past 30, that their physical and mental health was "not good" and the number of days that their health hindered their usual activities (Lorig et al., 1996).

Physician Communication

A three item scale was used to assess the communication between participants and their physicians. Items included the frequency that participants prepare a list of questions, ask questions, and discuss personal problems with their physician using a Likert response scale. To be included in analysis, participants must have answered at least two of the three items. The overall score was calculated by taking the average across all items answered. Chronbach's alpha for the three items was .82. It has been reported that this three item measure has an internal-consistency reliability of .73 and a test-retest reliability of .89 (Lorig et al., 1996). When considering each item separately, the range of item-scale correlations is .49-.66 (Lorig et al., 1996). Validation of the scored measure was previously calculated using correlations between it and other self-management behavior measures. Correlation values for this measure ranged from .00-.17 (Lorig et al., 1996).

Health Services Utilization

The number of visits to physicians, emergency departments, hospitalizations, and nights spent in a hospital, during the past six months were used to evaluate health care utilization. The response option for each of these questions was an open count. It has been reported that the questions had test-retest reliabilities of .76 for number of visits to physicians, .82 for number of visits to emergency departments, .89 for number of hospitalizations, and .97 for number of nights spent in a hospital (Lorig et al., 1996). Validation of each of these measures was previously calculated using chart audits on program participants. A trend of underreporting was observed for all five measures, but when computed as group average, the value was nearly accurate (Lorig et al., 1996). Because of this, these measures are considered to be representative of health care utilization (Lorig et al., 1996). Previously reported correlations between measures ranged from .01 to .60, with the highest correlation between number of times hospitalized and number of nights in the hospital, as would be expected since they are dependent on each other (Lorig et al., 1996).

Self-Management Behaviors

Self-management behaviors were evaluated using measures of exercise frequency and level of interference in social and daily activities by chronic disease symptoms. A single-item question was used to evaluate the weekly average time spent performing stretching or strengthening exercises and has a previously reported test-retest reliability of .56 (Lorig et al., 1996). Two measures were used to assess the amount of time spent performing aerobic exercises. These measures included time spent walking and time spent performing other aerobic activity. These measures were adapted from an original set of five items that were treated as a scale having a previously reported test-retest reliability of .72 (Lorig et al., 1996). All measures for stretching/strengthening and aerobic exercises had a Likert response scale. The measure for social/role activities limitations included four items with a Likert response scale. Participants were required to answer at least three of the four items to be included in analysis. The score for the scale was taken as the average across all answered items. The Chronbach's alpha for the four items was .92. The overall measure had a previously reported internal-consistency reliability of .91 and a test-retest reliability of .68 (Lorig et al., 1996), and a range of item-scale correlation of .77-.80 (Lorig et al., 1996). Validity for all self-management behaviors was previously assessed by examining the correlations amongst the measures. The correlations were found to support the fact that each measure of health behavior is independent of the others and all could be used in the same study without concern (Lorig et al., 1996).

Self-Efficacy

Self-efficacy was evaluated by measuring levels of confidence across several aspects of disease management including managing disease, managing emotions, communicating with a physician, and using techniques learned from the program using a Cantril ladder response scale. Self-efficacy to mange disease was calculated using a three-item scale, adapted from an original five-item scale. In this study, two items were removed from the original five, since the measure only required participants to answer any three of the five items in order to be included in analysis. Participants were required to answer all three items to be considered for analysis. Chronbach's alpha for the three items was .91. It has been reported that the original five-item scale had an internal-consistency reliability of .87, with a range of item-scale correlations of .58-.79 (Lorig et al., 1996). The score for this measure was calculated by taking the average across all three items. Self-efficacy to manage disease was previously validated by assessing the correlation between it and other self-efficacy health behaviors. Reported correlation values ranged from .36-.77, with a median of .55 (Lorig et al., 1996). Based on the correlation values, it was determined that the self-efficacy to manage disease index most closely measures self-efficacy for managing symptoms of depression, pain, and fatigue and self-efficacy of obtaining outside help (Lorig et al., 1996).

Self-efficacy to manage emotions was measured using a single-item Likert scale. This measure was adapted from a six-item scale that had previously reported internal-consistency reliability of .92 and a test-retest reliability of .82 with a range of item scale correlations from .74-.82 (Lorig et al., 1996). Self-efficacy to communicate with a physician was measured using a single-item Likert scale. This measure was adapted from a three-item scale that had previously reported internal consistency reliability of .90 and a test-retest reliability of .88 with a range of item scale correlations from .80-.83 (Lorig et al., 1996). Self-efficacy to use techniques learned in class was measured using a single-item Cantril ladder and developed specifically for this study.

Demographics

Each participant was asked to provide information on gender, age, race/ethnicity, income level, highest education level, marital status, disability status, household number, and county of residence in South Florida.

Analysis

Participant data for the period 10/01/2008 - 12/31/2010 was extracted from an online database and provided by the Health Foundation of South Florida. Participants younger than 55 years old or missing data on age (n = 271), were removed from the dataset (Figure 3.1). A secondary data analysis was performed using Statistical Package for the Social Sciences (SPSS) v.17 (IBM, 2009). Data was cleaned of outliers and values outside possible response limits. Counts, means, and standard deviations were obtained using frequency and descriptive data reports. One-way analysis of variance (ANOVA) was used to determine if outcome differences existed based on the demographic characteristics and baseline measures. Bonferonni corrections were used to determine if significant differences existed for multiple comparisons. The subdivision of the sample based on attendance of at least four of the six sessions offered is based on previous evaluations of CDSMP (K. Lorig, personal communication, August 26, 2011; Evaluation Center Texas A & M, 2008). Demographic and baseline data of those attending at least four sessions, and those attending less than four were compared using Pearson's chi-square and independent-samples t-tests. Average outcome differences between attendance groups were also compared using independent-samples t-tests. Due to the fact that multiple agencies offered CDSMP to a population with varied health issues, it was necessary to control for the variance these factors could introduce. Since the general linear model (GLM) is able to control for multiple covariates simultaneously (McCullagh & Nelder, 1989), it was used to assess changes in outcome measures (self-efficacy, health behaviors, and social/role activities) at baseline and 6-weeks, while controlling for delivering agency and general health at baseline. This study controlled for the possible effect of differences by delivering agency since further stratification by workshop location and instructor pairs would have required a larger sample than available (Localio, Berlin, Ten Have, & Kimmel, 2001). General health at baseline was controlled for since a great variability exists among older adults (Satariano, 2006). Power analysis was conducted using G*Power v. 3.0 with a moderate effect size of 0.50 and α=0.05 (Faul, Erdfelder, Lang, & Buchner, 2007).

Results

Between October 1, 2008 and December 31, 2010, a total of 1,356 participants attended at least one session of CDSMP and provided baseline data. From these participants, only 811 (59.81%) completed both the baseline survey and the last session survey at week six (Tables 3.1 and 3.2). All participants having both baseline and last session surveys are included in the main analysis (Table 3.3). Additional analysis comparing participants based on attendance is also provided (Tables 3.4, 3.5, and 3.6). A total of 712 participants attending at least four sessions and 99 attended less than four sessions. Power for comparison between those completing less than four sessions and those completing at least four sessions is .996.

Demographics

Participants were on average 74 years of age. The majority of participants were female (81%), living in Broward County (65%), single/not partnered (56%), White (47%), reported an income of less than $15,000 (37%), had a high school education level (27%), and lived with others (52%). Participants attended an average of 5.00 (± 1.33) sessions out of six and had an average of two chronic diseases, with 20.2% reporting three or more.

Baseline health and health care utilization

Self-rated health for participants averaged 3.10 out of a maximum score of 5. When asked the number of days during the past 30 for certain key measures, participants reported an average of 5.78 days for poor physical health, 5.16 for poor mental health, and 4.05 days where their normal activities had been prevented. In the previous six months, participants averaged 3.77 visits with a physician, 0.37 visits to the emergency room, and were hospitalized an average of 0.26 times with an average duration of 1.00 days. Level of communication with a physician averaged a composite score of 2 out of 3. Participants reported their level of fatigue as 3.92, level of shortness of breath as 2.35, level of pain as 3.97, and level of frustration as 2.47.

Outcomes

For all participants, results of the GLM showed statistically significant improvements, at six weeks, in four of the eight health behavior measures: self-efficacy to manage disease ($p = .001$), self-efficacy to manage emotions ($p = .026$), social/role activity limitation (*p* = .001), and time spent walking (*p* = .008). No significant differences were observed between baseline and six weeks for self-efficacy to communicate with a physician (*p* = .186), self-efficacy to use mental and physical techniques to manage symptoms (*p* = .487), time spent performing stretching/strengthening activities (*p* = .426,) and time spent performing other aerobic activities (*p* = .860) (Table 3.3).

Table 3.4 shows the outcome results for participants attending at least four classes. Statistically significant improvements at six weeks for self-efficacy to manage disease (*p* = .001), self-efficacy to manage emotions (*p* = .014), social/role activity limitation (*p* = .001), and time spent walking (*p* = .034) were identified. No significant differences were observed between baseline and six weeks for self-efficacy to communicate with a physician (*p* = .216), self-efficacy to use mental and physical techniques to manage symptoms (*p* = .142), time spent performing stretching/strengthening activities (*p* = .436), and time spent performing other aerobic activities (*p* = .955)

Table 3.5 shows the results for participants attending less than four classes. While improvements were observed from baseline to six weeks, only one was found to be statistically significant according to results of the GLM, time spent walking (*p* = .051). The measures of self-efficacy to manage disease (*p* = .370), self-efficacy to manage emotions (*p* = .779), social/role activity limitation (*p* = .590), self-efficacy to communicate with a physician (*p* = .648), self-efficacy to use mental and physical techniques to manage symptoms (*p* = .107), time spent performing stretching/strengthening activities (*p* = .856,) and time spent performing other aerobic activities (*p* = .379) were not significant.

Comparison between attendance groups

Differences in frequency, means, and magnitude of change for outcomes were evaluated using independent-samples t-tests to compare those attending less than four classes and those attending at least four (Tables 3.1, 3.2, and 3.3). All but one demographic variable and one health status measure did not show significant differences between attendance groups. Significant differences were observed between participants for the demographic variable of county of residence (*p* = .010) and the health status baseline measure of level of frustration in the past two weeks (*p* = .001). By percentage, those attending at least four sessions had a higher composition of participants from Broward County and a lower composition of participants from Miami-Dade County, while Monroe County was nearly equal in both groups. Level of frustration was lower for those attending less than four classes. While not statistically significant, participants attending less than four classes reported better self-rated health (*p* = .095), fewer poor physical health days (*p* = .323), and better levels across all health status measures (Table 3.2). Only one outcome measure showed a significant difference between groups, time spent performing other aerobic activity (*p*=.021) (Table 3.6). For participants attending less than four classes, the magnitude of change for outcomes was less across all measures, except self-efficacy to use mental and physical techniques to manage symptoms (Table 3.6).

Discussion

Currently, 80% of those over the age of 65 have at least one chronic disease (National Center for Chronic Disease Prevention and Health Promotion, 2011) and the majority of older adults manage two or more chronic diseases simultaneously (Wolff et al., 2002). The increase in prevalence of chronic disease has begun to strain the health care delivery system and made the need for better self-management imperative (Wagner et al., 2001). To combat this epidemic, chronic disease self-management programs have been developed and proven to increase self-efficacy, improve health status, and decrease hospitalizations (Goetzel et al., 2007; Ozminkowski et al., 2006; Chodosh et al., 2005; Wagner et al., 2001; Lorig et al., 1999). One of the self-management programs developed in response was the community-based CDSMP. A real-world implementation of CDSMP by multiple types of service agencies, using multiple types of sites, in a large-scale collaborative effort has never before been evaluated.

This study set out to test the hypotheses that statistically significant improvements would be observed for measures of self-efficacy, health behavior, and social activity/role limitations between baseline and week six, the end of program instruction. Improvements were seen across all measures; however two measures of self-efficacy were not statistically significant. These outcomes show that older adults who participate in CDSMP may improve their quality of life, reduce health care costs, and reduce the burden placed on the health care system by decreasing health care utilization.

Chronic disease can greatly affect quality of life by limiting daily activities, as (Centers for Disease Control and Prevention & National Center for Health Statistics, 2007). In our study, statistically significant improvements were observed in social/role activities limitations by 16.4% (Δ = .19, SD = 1.09, *p* = .001) and supports findings from previous research evaluating six month outcomes (Lorig et al., 1999) and 12 month (Lorig et al., 2001). The study by Lorig et al. in 1999 found a 3.9% increase between baseline and six months, with a statistically significant difference between the treatment and control group of *p* = .0007. The difference observed in the 2001 study by Lorig et al. showed a 10.0% improvement over baseline at 12 months ($p \leq .001$). Another study, by Lorig et al. in 2001, used the same question to assess limitations, but with a reversed scale. The study followed up with participants of a randomized trial at 12 and 24 months and found a non-significant worsening of limitations over baseline at 12 months (Δ = .0002, SD = .986, *p* = .995), and a non-significant improvement in limitations over baseline at 24 months (Δ = -.031, SD = 1.12, *p* = .516) (Lorig et al., 2001). The larger increase over baseline in our study, compared to studies evaluating outcomes at longer intervals, was expected as participants had just completed the intervention. Maintaining social interaction is important; as it has been shown to reduce the risk of disability, reduce depression, and act as a protective effect against cognitive decline (Fratiglioni, Paillard-Borg, & Winblad, 2004; Mendes de Leon, Glass, & Berkman, 2003). This finding reinforces the ability of CDSMP to improve quality of life by reducing the impact of chronic disease symptoms on daily life activities, at least in the short-term. Future research should investigate at what rate gains achieved in the short-term decline over the long-term.

The promotion of self-efficacy is often used in self-management programs due to its established success in influencing behavior (Lorig & Holman, 2003). Participants' self-efficacy to manage disease showed a significant increase of 16.4% (Δ = 1.12, SD =

2.41, *p* = .001) between baseline and week six. This finding of a 16.4% increase over baseline shows a much larger difference when compared to previous research by Farrell et al. that also found a statistically significant increase among 48 participants, also at six weeks, but of only 5.1% (Δ = .31, *p* = .10) (Farrell et al., 2004). The difference observed in our study is also large when compared to a study evaluating outcomes between baseline and one year (Δ = .31, SD = 1.67, *p* = .0001) and two years (Δ = .27, SD = 1.78, *p* = .009) (Lorig et al., 2001). Self-efficacy to manage emotions also showed statistically significant improvements of 19.5% at week six (Δ = 1.30, SD = 2.95, *p* = .026). No comparisons exist for this measure as it was developed specifically for this study.

Self-efficacy to use mental and physical techniques to manage symptoms showed an increase of 22.4% over baseline (Δ = 1.52, SD = 2.91, *p* = .487), but was not found to be statistically significant after controlling for agency and baseline health status. No comparison exists in previously conducted CDSMP evaluations for this measure, as it was developed specifically for this study. Self-efficacy to communicate with a physician, while showing an 11.2% improvement over baseline (Δ = .88, SD = 2.56, *p* = .186), was not found to be statistically significant. The lack of significance for these measures may be due to the time period between tests being too short to effect adequate change or a strong interaction with one of the covariates. Improved patient self-efficacy translates to improvement in health behavior, chronic disease outcomes, and ultimately quality of life (Kennedy et al., 2007; Griffiths et al., 2005; Barnason et al., 2003; Dallow & Anderson, 2003; Tsay, 2003; Brody et al., 2002; Kukafka, Lussier, Eng, Patel, & Cimino, 2002; Lorig et al., 2001; Warnecke et al., 2001; Lorig et al., 1999; Goeppinger, Arthur, Baglioni, Jr., Brunk, & Brunner, 1989). Improvements across all measures of self-efficacy, while marginal, suggest that participants are more likely to try and maintain new behaviors, resulting in an overall improvement chronic disease self-management (Bandura, 1977).

In this study, we found a significant improvement in time spent walking and non-significant improvements in physical activity for both time spent performing stretching/strengthening activities and time spent performing other aerobic activities. Other CDSMP studies have found significant improvements in physical activity outcomes at four months (Gitlin et al., 2008), six months (Kennedy et al., 2007; Lorig et al., 1999), and 12 months (Lorig et al., 2001). This study's participants showed an improvement of 32% in time spent walking ($\Delta = 0.57$, SD = 1.31, $p = .008$). The lack of significance for stretching and other aerobic activity could be explained by the fact that six weeks may be too short a time to establish an exercise regimen, and the interaction between these health behaviors and the controlled variables of delivering agency and baseline health status. A study by Farrell also found no significant differences at six-weeks and may suggest that these differences are best measured at longer intervals after program end (Farrell et al., 2004). Even though our findings were not significant two of the three measures, participants showed an improvement of 35% in time spent performing stretching/strengthening activities during the previous week ($\Delta = 0.53$, SD = 1.43, $p = .426$), and an improvement of 36% in time spent performing other aerobic activities ($\Delta = 0.25$, SD = 1.33, $p = .860$). The stamina to perform physical activity must be built up over time and repeated exposure. Regular physical activity is an important aspect of chronic disease self-management as it has been associated with a decrease in chronic disease incidence and delayed functional decline (Warburton, Nicol, & Bredin, 2006). The fact that participants were able to increase their activity time by over 30% in span of just six weeks seems promising if maintained. While still below the recommended minimum of 2.5 hours of moderate physical activity each week for older adults without physical limitations (Centers for Disease Control and Prevention, 2011), the large percentage increase shows that program participants are taking action in pursuing a recommended health promotion activity.

Although health care utilization was not evaluated in this study, a correlation between higher self-efficacy and lower utilization has been previously established (Lorig et al., 2001). Improvements in self-efficacy have been shown to reduce health care costs up to 20% (Fries, Koop, Sokolov, Beadle, & Wright, 1998). It is estimated that 75% of current health care costs are directly associated with chronic disease (Partnership for Solutions, 2004). For a person with at least one chronic disease, lifetime health care costs are five times greater when compared to a person without a chronic disease (Partnership for Solutions, 2004). Multiple cost-analysis studies have shown evidence of a financial benefit from CDSMP by assessing the difference in health care utilization from baseline, and its correlation with health status. Considering a delivery cost range of $70-$200 per participant to offer CDSMP, the net savings at six months was found to be $750 (Lorig et al., 1999), and at 12 months between $790 (Lorig et al., 2001) and $990 (Lorig et al., 2001). At the two-year mark, the health care savings was found to be $390-$520 (Lorig et al., 2001). The decrease in savings at the longer term, compared to short-term, was attributed to a natural increase in disability that accompanies aging and chronic disease progression (Lorig et al., 2001). CDSMP is able to achieve a reduction in health care utilization by providing participants the skills needed to improve health status (Lorig et al., 2001). This reduction in health care costs is directly related to less frequent use of health care services, both emergent and office visits, thereby benefiting an already over-burdened system (Institute of Medicine Committee on Health Care in America, 2001). In many cases, the cost burden of offering CDSMP is a large deterrent for community agencies wanting to serve older adult populations since it is not the community agency that realizes the ultimate cost savings, but instead health insurance companies and health care service providers (Lorig et al., 1999). The reduction in health care costs resulting from CDSMP should be used in efforts to gain financial support from insurance companies to offer CDSMP in many communities.

Working together, as part of the Healthy Aging Regional Collaborative (HARC), agencies offering CDSMP were able to call on shared resources, previous experience in implementation, and best practices. In addition to being made up of the individual agencies offering programs, the HARC also had a dedicated director from the Health Foundation of South Florida, as well as a Leadership Council made up of local community stakeholders. Agencies were encouraged to collaborate with each other to share ideas, practices that have worked and those that have not, sites, and instructors. Agencies participated in monthly telephone calls with a HARC director to report on their progress, voice concerns, and seek guidance.

Maintaining program fidelity is essential to the continued success of evidence-based programs. Fidelity monitoring of classes was also conducted and found a high adherence rate for program content and delivery (Palmer, Seff, Batra, & Melchior, 2011). The most often cited issue was the presence of distractions in the classroom setting, since many were conducted in common areas (cafeteria, community room, etc.). Most of these distractions occurred because of site clients or personnel passing through the classroom and noise caused by staff and site clients. Program managers should be aware of possible ambient noise levels and opportunity for distractions when selecting a site or classroom area.

Overall, this study found improvements in participant self-efficacy, health behavior, and social activity/role limitations. However, there are some limitations that need to be acknowledged. Since participants were recruited from sites that hold captive populations (nursing homes, day care centers, etc.) and sites with a standing client base (activity centers, health care clinics, etc.) they may not be representative the general older adult population living in the community. Study participants were also self-selected, showing a desire to learn about chronic disease management. This desire to participate may have influenced the outcomes of the study, since these participants showed an eagerness to learn about self-management. Self-selection can also bias the make-up of the sample, threatening both external and internal validity, by over representing members of the population wanting and able to participate in the intervention and under representing those unable to do so. Also, all surveys were self-administered which may result in self-report and recall biases. The information provided by participants could be incorrect as it was not verified. In addition, a number of fields were found to have missing data. This is most likely a result of the program not being implemented in a controlled setting, but a real-world setting. As this was a secondary data analysis, it was not possible to contact participants to complete the missing fields. There is also the possibility that results may have been influenced by factors other than CDSMP during the course of six weeks.

Even with these limitations, there are some notable strengths of the study. The use of an evidence-based program allows us to rule out potential biases, since the intervention has been repeatedly shown to achieve positive outcomes. By using previously validated measures in this study, we are able to increase measurement accuracy. Since there was a heterogeneous mix of agencies offering the program and participants, the outcome results obtained are likely to be more representative of those expected when CDSMP is implemented in other real-world settings compared to the results of controlled trials. No significant differences in outcomes were found between participants who completed or did not complete (attending fewer than four of six sessions) and participants with missing data compared to those with complete data.

Overall, findings from this investigation show that CDSMP, when implemented through a collaborative effort, leads to significant improvements between baseline and week six for participants in the areas of self-efficacy and social/role activity limitations, and non-significant improvements in health behavior. Previous studies have shown that similar health behavior changes, when sustained, continue to positively impact health and reduce utilization of health care services (Wagner et al., 2001; Clark et al., 2000). This had led to a national movement to deliver self-management programs to older adults through both traditional and emerging avenues, such as the internet. The successful implementation of CDSMP in South Florida will improve quality of life for older adult residents, reduce health care costs, and reduce the burden placed on the health care system by decreasing health care utilization. Further research should address the long-term maintenance of improvements amongst program participants in South Florida, as well as what role the Collaborative played in the intervention's success.

Figure 3.1 Flow diagram showing participant eligibility for analysis, CDSMP

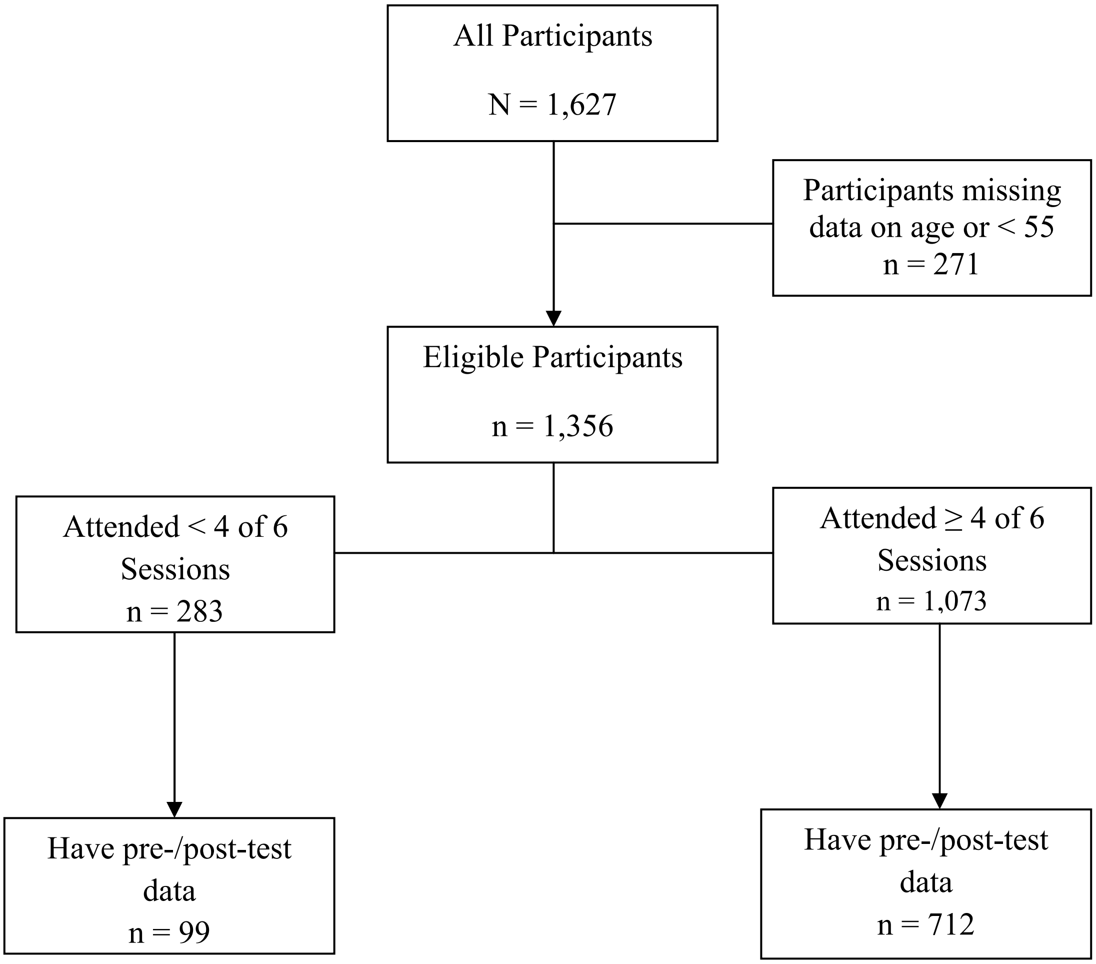


Table 3.1 Baseline demographic characteristics for CDSMP participants

	All Eligible Participants	**< 4 of 6 Sessions**	**≥ 4 of 6 Sessions**	***P*-value**
N	811	99	712	
	Mean (SD)	Mean (SD)	Mean (SD)	t-test
Mean age	74.02 (10.02)	72.99 (10.60)	74.16 (9.93)	.276
Mean number of chronic diseases	1.92 (1.09)	1.80 (.96)	1.94 (1.11)	.293
	n (%)	n (%)	n (%)	Chi-Square[a]
Gender				.701
Female	653 (80.5%)	79 (79.8%)	574 (80.6%)	
Male	146 (18.0%)	16 (16.2%)	130 (18.3%)	
County				.010
Broward	523 (64.5%)	60 (60.6%)	463 (65.0%)	
Miami-Dade	194 (23.9%)	19 (19.2%)	175 (24.6%)	
Monroe	86 (10.6%)	19 (19.2%)	67 (9.4%)	
Marital Status				.127
Married/Partnered	325 (40.1%)	33 (33.3%)	292 (41.0%)	
Single/Not Partnered	457 (56.4%)	63 (63.6%)	394 (55.3%)	
Disabled				.651
Yes	165 (20.3%)	18 (18.2%)	147 (20.6%)	
No	557 (68.7%)	68 (68.7%)	489 (68.7%)	
Race/Ethnicity				.595
African American	230 (28.4%)	28 (28.3%)	202 (28.4%)	
Hispanic	66 (8.1%)	11 (11.1%)	55 (7.7%)	
White	381 (47.0%)	47 (47.5%)	334 (46.9%)	
Income				.746
<$15,000	299 (36.9%)	38 (38.4%)	261 (36.7%)	
$15,000 - $24,999	119 (14.7%)	12 (12.1%)	107 (15.0%)	
≥ $25,000	119 (14.7%)	15 (15.2%)	104 (14.6%)	
Number in Household				.870
Lives Alone	386 (47.6%)	48 (48.5%)	338 (47.5%)	
Lives with Others	423 (52.2%)	51 (51.5%)	372 (52.2%)	
Education Level				.460
Less than High School	157 (19.4%)	21 (21.2%)	136 (19.1%)	
High School	222 (27.4%)	26 (26.3%)	196 (27.5%)	
Some College	193 (23.8%)	26 (26.3%)	167 (23.5%)	
College Graduate	193 (23.8%)	23 (23.2%)	170 (23.9%)	

[a] Pearson chi-square, two-tailed

Table 3.2 Baseline health status and health care utilization values for CDSMP participants

	All Eligible Participants	< 4 of 6 Sessions	≥ 4 of 6 Sessions	*P*-value[a]
N	811	99	712	
	Mean (SD)	Mean (SD)	Mean (SD)	
Self-rated health (1-5, ↓ = better)	3.10 (.90)	2.96 (.92)	3.12 (.89)	.095
Poor Physical Health Days (in the past 30)	5.78 (8.82)	4.91 (7.64)	5.90 (8.98)	.323
Poor Mental Health Days (in the past 30)	5.16 (8.55)	5.55 (9.24)	5.11 (8.45)	.646
Days where Activities were Prevented (in the past 30)	4.05 (7.77)	4.14 (7.96)	4.03 (7.75)	.907
Communication with Physician (0-5, ↑=better)	2.73 (1.44)	2.86 (1.43)	2.71 (1.44)	.358
MD visits (*n* in past 6 months)	3.77 (4.97)	3.41 (4.11)	3.74 (4.56)	.460
ER visits (*n* in past 6 months)	.37 (.98)	.39 (.78)	.37 (1.01)	.812
Times hospitalized (*n* past 6 months)	.26 (1.16)	.25 (.57)	.21 (.68)	.910
Days in hospital (*n* past 6 months)	1.00 (4.19)	1.22 (3.67)	.87 (3.50)	.607
Level of Fatigue (0-10, ↓=better)	3.92 (2.92)	3.65 (2.89)	3.95 (2.93)	.342
Level Shortness of Breath (0-10, ↓=better)	2.35 (2.81)	2.04 (2.65)	2.40 (2.83)	.256

Level of Pain (0-10, ↓=better)	3.97 (3.11)	3.47 (3.01)	4.04 (3.12)	.100
Level of Frustration (0-10, ↓=better)	2.47 (2.58)	1.55 (1.69)	2.60 (2.65)	.001

[a] Independent-samples t-test

Table 3.3 Change in outcomes from baseline to six weeks for all attendance, N = 811

	n	Baseline	6 Weeks	Δ	*P*
		Mean (SD)	Mean (SD)	Mean (SD)	
Self-Efficacy to Manage Disease (1-10, ↑=better)	768	6.85 (2.48)	7.97 (1.81)	1.12 (2.41)	.001
Self-Efficacy to Manage Emotions (1-10, ↑=better)	740	6.66 (2.93)	7.96 (2.12)	1.30 (2.95)	.026
Self-Efficacy to use mental and physical techniques to manage symptoms (1-10, ↑=better)	708	6.80 (2.88)	8.32 (1.87)	1.52 (2.91)	.487
Self-Efficacy to Communicate with Physician (1-10, ↑=better)	729	7.84 (2.56)	8.72 (1.73)	0.88 (2.56)	.186
Social/role activities limitations (0-4, ↑= better)	746	2.84 (1.16)	3.03 (1.04)	0.19 (1.09)	.001
Time Stretching (0-4, ↑= more time)	704	1.51 (1.30)	2.04 (1.24)	0.53 (1.43)	.426
Time Walking (0-4, ↑= more time)	734	1.79 (1.35)	2.36 (1.24)	0.57 (1.31)	.008
Time Other Aerobics (0-4, ↑= more time)	578	0.69 (1.21)	0.94 (1.31)	0.25 (1.33)	.860

Table 3.4 Change in outcomes from baseline to six weeks for ≥ 4 sessions, N = 712

	n	Baseline	6 Weeks	Δ	*P*
		Mean (SD)	Mean (SD)	Mean (SD)	
Self-Efficacy to Manage Disease (1-10, ↑=better)	676	6.80 (2.48)	7.97 (1.78)	1.17 (2.43)	.001
Self-Efficacy to Manage Emotions (1-10, ↑=better)	654	6.64 (2.95)	7.99 (2.10)	1.35 (2.94)	.014
Self-Efficacy to use mental and physical techniques to manage symptoms (1-10, ↑=better)	627	6.83 (2.90)	8.34 (1.85)	1.51 (2.89)	.142
Self-Efficacy to Communicate with Physician (1-10, ↑=better)	642	7.82 (2.57)	8.71 (1.72)	0.89 (2.55)	.216
Social/role activities limitations (0-4, ↑= better)	659	2.83 (1.18)	3.02 (1.04)	0.19 (1.12)	.001
Time Stretching (0-4, ↑= more time)	625	1.53 (1.30)	2.05 (1.24)	0.52 (1.43)	.436
Time Walking (0-4, ↑= more time)	643	1.79 (1.35)	2.36 (1.24)	0.57 (1.32)	.034
Time Other Aerobics (0-4, ↑= more time)	515	0.70 (1.21)	0.99 (1.32)	0.29 (1.38)	.955

Table 3.5 Change in outcomes from baseline to six weeks for < 4 sessions, N = 99

	n	Baseline	6 Weeks	Δ	*P*
		Mean (SD)	Mean (SD)	Mean (SD)	
Self-Efficacy to Manage Disease (1-10, ↑=better)	92	7.22 (2.42)	7.93 (2.09)	0.71 (2.20)	.370
Self-Efficacy to Manage Emotions (1-10, ↑=better)	86	6.77 (2.82)	7.72 (2.28)	0.95 (3.05)	.779
Self-Efficacy to use mental and physical techniques to manage symptoms (1-10, ↑=better)	81	6.57 (2.77)	8.15 (2.04)	1.58 (3.06)	.107
Self-Efficacy to Communicate with Physician (1-10, ↑=better)	87	7.98 (2.48)	8.79 (1.86)	0.81 (2.64)	.648
Social/role activities limitations (0-4, ↑= better)	87	2.96 (1.05)	3.13 (1.03)	0.17 (.90)	.590
Time Stretching (0-4, ↑= more time)	79	1.43 (1.32)	1.95 (1.24)	0.52 (1.44)	.856
Time Walking (0-4, ↑= more time)	83	1.81 (1.35)	2.30 (1.21)	0.49 (1.23)	.051
Time Other Aerobics (0-4, ↑= more time)	63	0.63 (1.18)	0.52 (1.06)	-0.11 (1.59)	.860

Table 3.6 Comparison of outcomes between completer groups

	All Attendance	< 4 of 6 Sessions	≥ 4 of 6 Sessions	P^a
	N = 811	N = 99	N = 712	
	Mean Δ (SD)	Mean Δ (SD)	Mean Δ (SD)	
Self-Efficacy to Manage Disease	1.12 (2.41)	0.71 (2.20)	1.17 (2.43)	.065
Self-Efficacy to Manage Emotions	1.30 (2.95)	0.95 (3.05)	1.35 (2.94)	.178
Self-Efficacy to use mental and physical techniques to manage symptoms	1.52 (2.91)	1.58 (3.06)	1.51 (2.89)	.960
Self-Efficacy to Communicate with Physician	0.88 (2.56)	0.81 (2.64)	0.89 (2.55)	.653
Social/role activities limitations	0.19 (1.09)	0.17 (.90)	0.19 (1.12)	.841
Time Stretching (0-4, ↑= more time)	0.53 (1.43)	0.52 (1.44)	0.52 (1.43)	.879
Time Walking (0-4, ↑= more time)	0.57 (1.31)	0.49 (1.23)	0.57 (1.32)	.743
Time Other Aerobics (0-4, ↑= more time)	0.25 (1.33)	-0.11 (1.59)	0.29 (1.38)	.021

[a] Independent-samples t-test

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Chapter 4

Manuscript 2: Intermediate Outcomes of TCDS Offered by Members of the Healthy Aging Regional Collaborative in South Florida

Introduction

Hispanics suffer disproportionately in both the prevalence and impact chronic disease (Centers for Disease Control and Prevention, 2011a; Perez-Escamilla, 2010; National Center for Health Statistics, 2010; Harris, Klein, Cowie, Rowland, & Byrd-Holt, 1998). The most common chronic diseases for Hispanics are diabetes, hypertension, liver disease, arthritis, lower respiratory diseases, stroke, cancer, and heart disease (Centers for Disease Control and Prevention, 2011a; National Center for Health Statistics, 2010). Of the top 10 leading causes of death for Hispanics, chronic diseases make up six (Centers for Disease Control and Prevention, 2010). Hispanics suffer disproportionately from diabetes and cardiovascular diseases (Hayes et al., 2011; National Center for Health Statistics, 2010). Also, Hispanics are more likely to have greater disease severity (National Center for Health Statistics, 2010) and report their health status as fair/poor (Hayes et al., 2011). Factors contributing to these disparities include language and cultural barriers, lack of access to preventive services, lack of health insurance, and an increasing trend of chronic disease prevalence and comorbidity (Perez-Escamilla, 2011; U.S.Census Bureau, 2010; Lorig, Ritter, & Gonzalez, 2003; United States Commission on Civil Rights, 1999). Hispanics also face disparities in quality of, and access to, health care (Agency for Healthcare Research and Quality, 2005; Institute of Medicine Committee on Health Care in America, 2001), emphasizing the need to improve chronic disease self-management.

Self-management of chronic conditions, by older adults, is an important public health priority as a large percentage of the population approaches the age of 65 and health care costs continue to rise (McDonald, Rogers, & Macdonald, 2008; Livingston, Minushkin, & Cohn, 2008). Older adults having one chronic disease are more likely to develop additional chronic diseases (Tucker-Seeley, Li, Sorensen, & Subramanian, 2011; National Heart Lung and Blood Institute, 2008), with the majority managing two or more chronic diseases simultaneously (Wolff, Starfield, & Anderson, 2002; Guralnik, LaCroix, Everett, & Kova, 1989). While many suffering from a chronic disease are not able to effectively manage their conditions, Hispanics report lower levels of symptom management self-efficacy (Bethell, Lansky, & Fiorillo, 2001). Of Hispanics over the age of 65, 24% rate their health as fair or poor (Centers for Disease Control and Prevention, 2010).

Hispanics are the largest and fastest growing minority in the United States (Jurkowski, Mosquera, & Ramos, 2010). According to the 2000 US Census, there are an estimated 250,000 older, Hispanic, adults in South Florida (U.S.Census Bureau, 2000). Given the large older adult population in South Florida, the Health Foundation of South Florida created the Healthy Aging Regional Collaborative (HARC) to offer evidence-based health promotion programs to older adults through community-based agencies. The HARC's target population included older adults within Broward and Miami-Dade Counties. Wanting to target chronic disease self-management education, HARC chose to offer the Spanish language chronic disease self-management program, Tomando Control de su Salud (TCDS).

TCDS was developed to be culturally appropriate for Hispanic populations and attempts to improve self-efficacy through skills mastery, modeling, reinterpretation of symptoms, and social persuasion (Lorig et al., 2003). This association between self-efficacy and psychological well-being is supported by a study Latinas suffering from a chronic disease (Abraido-Lanza, 1997). Cultural beliefs play a significant role in health behavior and beliefs (Jurkowski et al., 2010). This fact is important when designing and implementing culturally tailored programs as there are many different subgroups of Hispanic culture, even amongst those from the same country (Perez-Escamilla, 2011; Siqueira & Crandall, 2008; Peek, Cargill, & Huang, 2007).

The purpose of this investigation was to examine whether the culturally-specific chronic disease self-management program, Tomando Control de su Salud (TCDS), when implemented by community-based agencies through a large-scale collaborative effort in South Florida, can increase symptom management self-efficacy, social activity, and time spent exercising. Since limited information is available on the translation of TCDS to practice settings, this study will focus on program outcomes to evaluate its effectiveness outside of controlled trials. It is hypothesized that at the sixth and final session program participants will show significant improvements over baseline scores for self-efficacy, social activity limitations, and time spent exercising. It is also hypothesized that those participants meeting the minimum attendance of at least four sessions will show greater improvement in the same areas, compared to those participants attending less than four sessions. Four sessions was chosen as the minimum attendance value based on discussions with program developers (K. Lorig, personal communication, August 26, 2011), previous evaluations (Evaluation Center Texas A & M, 2008), and the fact that it is the minimum session number greater than 50% of the total number of sessions offered.

Methods

Setting and Participants

The Health Foundation of South Florida (HFSF) funded a total of eight agencies which offered 82 TCDS workshops throughout Broward and Miami-Dade Counties in Florida from 10/1/2008 through 12/31/2010. Agencies that were selected to offer TCDS included six community service agencies/health clinics targeting older adults, one hospital, and one county-level Elderly and Veterans Affairs department. These agencies then offered TCDS workshops in churches, nursing homes, community centers, residential community clubhouses, and health clinics throughout Broward and Miami-Dade Counties. A total of 62 sites were used.

Agencies recruited participants from their existing client base and throughout the community using fliers, advertising, and word of mouth. The target population consisted of Spanish-speaking Hispanic adults aged 55 years or older and had at least one self-reported chronic disease. Participants were excluded from analysis if their age was missing or they were less than 55 years of age and they did not report at least one chronic disease.

Training and Fidelity Monitoring

Instructors were required to attend a four-day (20 hour), program-specific, training. For their first workshop, new instructors were paired with an experienced instructor (Stanford Patient Education Research Center, 1993). Instructors were required to be health care professionals or peers, and have experience managing a chronic disease.

HARC agencies were encouraged to share resources, strategies, and seek best practices from each other.

Fidelity monitoring was conducted at random based on the proposed number of workshops. Using a random number generator, one of the six workshop sessions was selected for observation, excluding session one. The goal was to monitor 30% of offered workshops. To maintain program fidelity, workshop instructors were required to follow the presentation order and scripts laid out in the Leader's Manual that was developed by program developers. Agency level program managers were given at least one week's notice prior to a site visit. Fidelity monitoring was conducted on 12% ($n = 10$) of all TCDS workshops offered, and included the evaluation of the workshop site, classroom environment, participant-instructor interaction, and delivery of program content.

Intervention

Each week, a two-and-a-half hour class was offered for a total duration of six weeks. Two instructors led each class and followed the order and scripts in the Leader's Manual. To ensure adequate social interaction, workshops were not to start unless eight participants had registered for the first session. TCDS recommends an average class size of 12-15 participants with a minimum of six and a maximum of 20 (Stanford Patient Education Research Center, 1993). To improve self-efficacy and self-management, TCDS uses lectures, role play, and brainstorming to teach participants disease management skills, problem solving techniques, critical thinking, and how to appropriately use available resources (Lorig et al., 1999).

Data Collection

All participants completed an informed consent, a demographic survey, and first session survey prior to the start of the first session. At the end of the sixth and final session, participants in attendance completed a last session survey that repeated some measures from the first session survey. Surveys were administered by instructors and staff of the delivering agency in case participants needed clarification of questions, or were unable to read or write. Following the sixth session, agency staff entered TCDS participant data into an online database. The original forms were then sent to an independent evaluation team for data entry verification.

Measures

To be consistent with other evaluations of TCDS, this study used some of the same measures. Outcome measures to be evaluated include self-efficacy, health status, and health behavior. The modification of some measures was necessary to decrease the burden of the survey on participants. Examples of questions and response scales are displayed in Table A.1.

Health Status

A single-item assessed self-rated health and originated from *The National Health Interview Survey* (National Center for Health Statistics, 1991). A test-retest reliability of .87 has been previously reported for this item (Gonzalez, Stewart, Ritter, & Lorig, 1995). This measure was previously validated, in English, by assessing correlation values between it and other health status measures and ranged from .28-.46 (Lorig et al., 1996).

Level of pain, fatigue, shortness of breath, and frustration in the previous two weeks were measured using a modified visual-numeric scale. This scale used 10 histograms of different heights and shading intensities. Reliability and validity has previously been assessed for only the level of pain scale and achieved a test-retest reliability of .64 and a correlation value of .72 (Lorig et al., 1996; Gonzalez et al., 1995). Validity and reliability results have not been established for fatigue, shortness of breath, and frustration. The number of days, out of the past 30, that physical and mental health was "not good" and the number of days that their health hindered their usual activities was also reported by participants at baseline and has previously been used in other chronic disease self-management measures (Lorig et al., 1996).

Physician Communication

A scale, consisting of three items, was used to assess physician-patient communication. Items included frequency of preparing a question list, asking questions, and discussing personal problems with a physician using a Likert response scale. Participants were required to answer at least two of the three items in order to be included in analysis. The measure's overall score was reported as the average across all items. Chronbach's alpha for the three items was .74. It has been reported that this measure has an internal-consistency reliability of .73 and a test-retest reliability of .89 (Lorig et al., 1996); with each item falling within the range of item-scale correlations of .49-.66 (Lorig et al., 1996). Using correlations between it and other self-management behavior measures, this measure was previously validated (Lorig et al., 1996).

Health Services Utilization

To evaluate health care utilization, participants were asked to report the number of visits to physicians, emergency departments, hospitalizations, and nights spent in a hospital, during the past six months. Previously reported test-retest reliabilities are .76 for physician visits, .82 for visits to emergency departments, .89 for hospitalizations, and .97 for nights spent in a hospital (Lorig et al., 1996). In another study, these measures were validated against participants' medical charts (Lorig et al., 1996); where underreporting was observed, but the value was very close to accurate when computed as group average. As a result, these measures are accepted as being representative of health care utilization. Reported between measure correlations ranged from .01 to .60, with the highest correlation between number of times hospitalized and number of nights in the hospital (Lorig et al., 1996).

Self-Management Behaviors

Using the measures of exercise frequency and level of interference in social and daily activities by chronic disease symptoms, self-management behaviors were evaluated. To evaluate the amount of time per week spent performing stretching or strengthening exercises, a single item was used having a previously reported test-retest reliability of .91 (Gonzalez et al., 1995). The time per week spent performing aerobic exercises was assessed using two items, adapted from an original set of five items. The two items included time spent walking and time spent performing other aerobic activity. This measure has a reported test-retest reliability of .89 (Gonzalez et al., 1995). The measures assessing stretching/strengthening and aerobic exercises used a Likert response scale. Four items using a Likert response sale were used to measure social/role activities limitations. To be included in analysis, participants were required to answer at least three of the four items. An average across all answered items was calculated. Chronbach's alpha for the four items was .93. Overall, the measure has a reported internal-consistency reliability of .91 and a test-retest reliability of .68 (Lorig et al., 1996). Individual items have a previously reported range of item-scale correlation of .77-.80 (Lorig et al., 1996). By examining the correlations amongst the measures, validity for all self-management behaviors were assessed.

Self-Efficacy

Measures of confidence across multiple aspects of disease management including managing disease, managing emotions, communicating with a physician, and using techniques learned from the program, were used to evaluate self-efficacy using a Cantril ladder response scale. From a five-item scale, three were used to measure self-efficacy to mange disease. Since the measure only required answers to any three of the five items in order to be included in analysis, two items were removed to shorten the survey. To be included in analysis, participants were required to answer all three items. Chronbach's alpha for the three items was .94. Previously tested in a Spanish population, the internal-consistency reliability of the original five-item scale was 0.85, and had a test-retest validity of 0.80 (Lorig, Ritter, & Jacquez, 2005). An average across three items was calculated. The correlation between self-efficacy to manage disease and other self-efficacy health behaviors was used to validate the measure, with previously reported correlation values ranging from .36-.77, with a median of .55 (Lorig et al., 1996). The self-efficacy to manage disease index most closely measures self-efficacy to manage depression, pain, and fatigue, and self-efficacy to obtain outside help (Lorig et al., 1996).

A single-item Likert scale was used to measure self-efficacy to manage emotions. This measure was adapted from a six-item scale that had a reported internal-consistency reliability of .92, a test-retest reliability of .82, and a range of item scale correlations from .74-.82 (Lorig et al., 1996). A single-item Likert scale was used to measure self-efficacy to communicate with a physician. The original three-item scale had previously reported internal consistency reliability of .90, a test-retest reliability of .88, with a range of item scale correlations from .80-.83 (Lorig et al., 1996). Using a single-item, self-efficacy to use techniques learned in class was measured using a Cantril ladder.

Demographics

Information on gender, age, race/ethnicity, income level, highest education level, marital status, disability status, household number, and county of residence in South Florida was requested of each participant.

Analysis

Participant data for the period 10/01/2008 - 12/31/2010 was extracted from an online database and provided by the Health Foundation of South Florida. Participants younger than 55 years old or missing data on age (n = 160), were removed from the dataset (Figure 4.1). A secondary data analysis was performed using SPSS v.17 (IBM, 2009). Data was cleaned of outliers and values outside possible response limits. Counts, means, and standard deviations were obtained using frequency and descriptive data reports. One-way analysis of variance (ANOVA) was used to determine if outcome differences existed based on demographic characteristics and baseline measures. Bonferonni corrections were used to determine if significant differences existed for multiple comparisons. Demographic and baseline data of program completers were compared to non-completers using Pearson's chi-square and independent-samples t-tests. Average outcome differences between completers and non-completers were also compared using independent-samples t-tests. As multiple agencies delivered TCDS to a population with varied levels of perceived general health, it was necessary to take into account the variance that these factors could introduce. The general linear model (GLM) was chosen to assess within-subject changes in outcome measures (self-efficacy, health behaviors, and social/role activities) at baseline and 6-weeks, since it is able to control for multiple covariates at the same time (McCullagh & Nelder, 1989). In analysis, this study controlled for both delivering agency and general health at baseline. While workshops were delivered in different physical locations and by different instructor pairs, we decided to control for agency effect since stratification to those levels would have required a larger sample (Localio, Berlin, Ten Have, & Kimmel, 2001). Due to the known variability of general health among older adults, this factor was controlled for using baseline values (Satariano, 2006). Power analysis for comparison between attendance groups was conducted using G*Power v. 3.0 with a moderate effect of 0.50 and $\alpha=0.05$ (Faul, Erdfelder, Lang, & Buchner, 2007).

Results

Between October 1, 2008 and December 31, 2010, a total of 1,026 participants attended at least one session of TCDS and 919 (89.57%) completed a baseline questionnaire (Tables 4.1 and 4.2). Of those attending at least one session, 806 (78.56%) completed the program by attending four of the six sessions offered (Stanford Patient Education Research Center, 1993). Sixty-six percent of all participants (n = 682) completed both baseline and six-week questionnaires, and are included in analysis. A total of 101 participants attended less than four sessions and 581 attended at least four sessions. Power for comparison between those completing less than four sessions and those completing at least four sessions is .996.

Demographics

Participants were on average 76 years of age, with a range of 55 to 102 years. The majority of participants were female (83%), living in Miami-Dade County (78%), single/not partnered (60%), with an income of less than $15,000 (63%), and an education level of less than high school (38%). Participants attended an average of 4.95 (±1.42) sessions out of six and reported an average of two chronic diseases, with 25.2% reporting three or more.

Baseline health and health care utilization

Participants' self-rated health averaged 3.22. When asked the number of days during the past 30 for certain key measures, participants reported an average of 5.75 days for poor physical health, 4.65 for poor mental health, and 3.53 where their normal activities had been prevented. In the previous six months, participants averaged 2.75 visits with a physician and 0.21 visits to the emergency room. Also in the past six months, participants were hospitalized an average of 0.18 times with an average duration of 0.50 days. Level of communication with a physician averaged a composite score of 2.35. Participants reported their level of fatigue as 3.12, level of shortness of breath as 1.94, level of pain as 3.47, and level of frustration as 2.00 (Table 4.2).

Outcomes

For all participants there were statistically significant improvements according to GLM results, at six weeks, in five of the eight health behavior measures: self-efficacy to manage symptoms (p = .006), social activity limitation (p = .001), time spent walking (p = .016), and time spent performing other aerobic activity (p = .005) (Table 4.3). No significant differences were observed between baseline and six weeks for self-efficacy to manage emotions (*p* = .162), self-efficacy to use mental and physical techniques to manage symptoms (*p* = .787), and self-efficacy to communicate with a physician (*p* = .480), although all measures did show improvement in the expected direction as compared to baseline scores.

For participants attending at least four sessions, statistically significant improvements were seen at six weeks for self-efficacy to manage disease (*p* = .020), social/role activity limitation (*p* = .001), time spent walking (*p* = .022), and time spent performing other aerobic activities (*p* = .013) (Table 4.4). No significant differences were observed between baseline and six weeks for self-efficacy to communicate with a physician (*p* = .319), self-efficacy to use mental and physical techniques to manage symptoms (*p* = .595), self-efficacy to manage emotions (*p* = .206), and time spent performing stretching/strengthening activities (*p* = .202).

Table 4.5 shows the outcome results for participants attending less than four classes. While improvements were observed from baseline to six weeks, only two were found to be statistically significant: social/role activity limitation (*p* = .047) and time spent performing stretching/strengthening activities (*p* = .021). No significant differences were observed between baseline and six weeks for self-efficacy to manage disease (*p* = .141), self-efficacy to manage emotions (*p* = .658), self-efficacy to communicate with a physician (*p* = .213), self-efficacy to use mental and physical techniques to manage symptoms (*p* = .419), time spent walking (*p* = .711), and time spent performing other aerobic activities (*p* = .501).

Comparison between attendance groups

Differences in frequency, means, and magnitude of change for outcomes were observed when comparing those attending less than four classes and those attending at least four using Pearson chi-square and independent-samples t-tests (Tables 4.1, 4.2, and 4.6). Between groups, all but one demographic variable and one health status measure did not show significant differences. Significant differences were observed between participants for number in household (p = .037) and level of frustration in the past two weeks (p = .052). Participants attending at least four sessions were more likely to be from Miami-Dade County and live alone. Level of frustration was lower for those attending less than four classes. While not statistically significant, participants attending less than four classes reported better self-rated health, fewer poor physical health days, and better levels across all health status measures, except for level of fatigue (Table 4.2). Only one outcome reported a significant difference between groups, time spent performing other aerobic activity (p=.028) (Table 4.6). For participants attending less than four classes, the magnitude of change for outcomes was greater across all measures; except time spent walking and time spent performing other aerobic activities (Table 4.6).

Discussion

Hispanics suffer disproportionately in both chronic disease prevalence and severity (Centers for Disease Control and Prevention, 2011a; Perez-Escamilla, 2010; National Center for Health Statistics, 2010; Harris et al., 1998). Of those over the age of 65, 80% have at least one chronic disease, with most having at least two (National Center for Chronic Disease Prevention and Health Promotion, 2011; Wolff et al., 2002). Hispanics also report lower levels of symptom management self-efficacy (Bethell et al., 2001). Of Hispanics over the age of 65, 24% rate their health as fair or poor (Centers for Disease Control and Prevention, 2010). In response to the prevalence of chronic disease and related disparities facing Hispanics, TCDS was developed to help reduce the tide of chronic disease in the Hispanic (Lorig et al., 2003).

This study set out to test the hypothesis that significant improvements at six weeks would be observed for self-efficacy, health behavior, and social/role activity limitations. For the most part, all measures showed improvements at week six, however three measures of self-efficacy were not statistically significant.

Participants' self-efficacy to manage symptoms significantly increased 19.3% ($\Delta = 1.30$, SD = 2.94, $p = .006$) between baseline and six weeks. This finding supports others found by Lorig and colleagues (2005) evaluating differences between baseline and four months ($\Delta = 1.76$, SD = 3.04, $p < .001$) and at 12 months ($\Delta = 1.17$, SD = 3.00, $p < .001$) (Lorig et al., 2005), and another study by Lorig and colleagues (2003) at four months ($p < .001$) and 12 months ($\Delta = 1.17$, SD = 3.10, $p < .0001$) (Lorig et al., 2003). The following measures of self-efficacy did show increases at six weeks over baseline scores, but were not statistically significant. These measures have not been evaluated in other studies of TCDS. Self-efficacy to manage emotions showed an increase of 21.8% ($\Delta = 1.45$, SD = 3.30, $p = .162$), self-efficacy to communicate with a physician showed an increase of 10.5% ($\Delta = .83$, SD = 2.81, $p = .480$), and self-efficacy to use mental and physical techniques to manage symptoms showed an increase of 36.4% over baseline ($\Delta = 2.19$, SD = 3.64, $p = .787$). While large improvements were seen in these measures, the lack of statistical significance could be the result of strong interaction between the measures and the covariates of agency and baseline health status. Self-efficacy plays a central role in self-management because it directly influences behavior (Lorig & Holman, 2003; Bandura, 1977). Improved self-efficacy among health promotion program participants translates to improvement in health behavior, chronic disease outcomes, and ultimately quality of life (Kennedy et al., 2007; Griffiths et al., 2005; Barnason et al., 2003; Dallow & Anderson, 2003; Tsay, 2003; Brody et al., 2002; Kukafka, Lussier, Eng, Patel, & Cimino, 2002; Aljasem, Peyrot, Wissow, & Rubin, 2002; Lorig et al., 2001; Warnecke et al., 2001; Bernal, Woolley, Schenaul, & Dickinson, 2000; Lorig et al., 1999; Goeppinger, Arthur, Baglioni, Jr., Brunk, & Brunner, 1989).

Physical activity is an important health behavior in managing chronic disease as it has been linked to a reduction in symptom severity and an improved perception of overall health (Lorig & Holman, 2003; Lorig et al., 1996). Participants in this study showed a significant improvement of 38% in time spent walking ($\Delta = 0.55$, SD = 1.40, $p = .016$) and an improvement of 105% in time spent performing other aerobic activity ($\Delta = 0.45$, SD = 1.39, $p = .005$). The finding of this study supports others found by Lorig and colleagues (2005) evaluating differences in minutes spent performing aerobic activity between baseline and four months ($\Delta = 47.4$, SD = 144, $p < .0001$) and at 12 months ($\Delta = 22.8$, SD = 146, $p < .0001$) (Lorig et al., 2005), and another study by Lorig and colleagues (2003) at four months ($p = .001$) and 12 months ($\Delta = 59.0$, SD = 148, $p < .0001$) (Lorig et al., 2003). These studies evaluating time spent performing aerobic activity, by Lorig and colleagues, converted the Likert scale completed by participants, by assigning minute values that fall half way between the range provided (e.g. one to three hours equals 120 minutes). A nearly significant improvement of 63.9% was observed in average time spent performing stretching/strengthening activities during a week (Δ = 0.69, SD = 1.54, $p = .062$). Previous studies evaluating TCDS did not report on this measure. Reasons for this outcome not being significant could include the interaction between it and the covariates of delivering agency and baseline health. Our study findings of large improvements in time performing exercise activities between baseline and six weeks are promising, but must be considered in the context that baseline values were small to begin with. Maintenance of exercise regimens brought about by attending TCDS may lead to continued increases in time spent performing activities. When applying the same conversion as used by Lorig et al., our study participants fall below the CDC's recommendation of 2.5 hours of moderate physical activity each week with an average of 94 minutes performing aerobic activity and 58 minutes performing stretching/strengthening activity each week (Centers for Disease Control and Prevention, 2011b).

In this study, significant improvements were seen for social/role activities limitations by 5.9% among program participants (Δ = .05, SD = 1.28, $p = .001$). This finding supports others found by Lorig and colleagues (2005), who did not reverse survey scales, evaluating differences between baseline and four months (Δ = -.376, SD = 1.14, $p < .001$) and at 12 months (Δ = -.389, SD = 1.10, $p = .024$) (Lorig et al., 2005), and another study by Lorig and colleagues (2003) using a similar scale at four months ($p < .001$) and 12 months ($p < .0001$) (Lorig et al., 2003). Compared to past findings, our magnitude of change seems very small. However, since our study only evaluated outcomes at six weeks, compared to others at four and 12 months, it is possible that the effect of the program did not have time to make as strong of an impact in decreasing associated social/role activity limitations. Maintenance of social activity is important for older adults as it can reduce depression, reduce the risk of disability, and slow cognitive decline (Fratiglioni, Paillard-Borg, & Winblad, 2004).

Differences in outcomes between those attending less than four sessions and those attending at least four sessions were found to be statistically non-significant. This could be the result of participants receiving benefits from the classes they did attend, by reading the class text on their own, or through other participants sharing what was learned in a class with others who were absent. When considering outcomes for participants attending less than four sessions, the magnitude of difference was greater for all measures except time spent walking and time spent performing other aerobic activities, compared to those attending at least four sessions. The difference between baseline and six weeks, for participants attending less than four sessions, was found to be significant for only two measures, social/role activity limitations ($p = .047$) and time spent performing stretching and strengthening activities ($p = .021$). For participants attending at least four sessions, statistically significant improvements were seen in the measures of self-efficacy to manage disease ($p = .020$), social/role activities limitations ($p = .001$), time spent walking ($p = .022$), and time spent performing other aerobic activities ($p = .013$). These findings show that attending at least four sessions increases the likelihood that the program itself led to the desired outcomes of increased self-efficacy, decreased social/role activity limitations, and improved health behavior.

The only published evaluation on TCDS is a randomized, control trial that considers the difference between baseline, four, and 12 months (Lorig et al., 2003). Further research should evaluate the effectiveness of TCDS when translated by community agencies. Future evaluations at intervals greater than 12 months will identify at what point program benefits are no longer retained, and where a booster course might be warranted. Previous self-management studies have shown that similar health behavior changes, when sustained, continue to positively impact health and reduce utilization of health care services (Wagner et al., 2001; Clark et al., 2000). Future research might further evaluate the effectiveness of the TCDS when delivered to different cultures within the Hispanic community. Although TCDS was specifically developed to be culturally appropriate for Spanish-speakers, the diverse sub-cultures present within the Hispanic community, such as Caribbean, Central, and South American, might benefit from additional cultural tailoring (Siqueira & Crandall, 2008; Peek et al., 2007), as would participants at different stages in the acculturation process (Perez-Escamilla, 2011).

Agencies offering TCDS were part of the Healthy Aging Regional Collaborative (HARC) offering a suite of evidence-based health promotion programs to older adults. The HARC covered program licensing costs, coordinated instructor trainings, advertised workshop offerings, and led monthly conference calls to discuss implementation concerns being faced by the agencies. This helped reduce the initial capital required by agencies to offer a program and the barriers to implementation had each agency offered TCDS on their own.

Maintaining fidelity is the key to successfully translating an evidence-based health promotion program (Cross & West, 2011). Results of fidelity monitoring found a high adherence rate for program content and delivery in the 12% of workshops observed (Palmer, Seff, Batra, & Melchior, 2011). One of the most often cited issues (50%) was the presence of distractions during class. This occurred because many workshops were conducted in common areas (cafeteria, community room, etc.), and were the result of site clients or personnel passing through the classroom or making noise. When choosing a site to act as a classroom, program managers should be aware of possible ambient noise levels and opportunity for distractions. Another common issue (50%) was the failure to arrange participants in a way that encouraged group interaction, a major component of the program design. During three of the observations, deviations from content delivery were noted, and included not referring to a listed chart, not using brainstorming when prescribed, and participants not creating action plans.

With this success, however, limitations of the study do need to be acknowledged. Participants were, at times, recruited from captive populations, such as a nursing home or day care center, and at other times from sites that had a standing history of clients, such as activity centers or health care clinics. Because participants were self-selected, bias could be introduced to both the sample and the results. The sample could be biased by the over representation of the population that is both able to and wants to participate. The results could be influenced by self-selection since all participants actively wanted to learn more about caring for their chronic disease, thus not necessarily being representative of the older adult population in general. The self-administration of surveys could introduce report and recall biases. Survey responses by participants were not verified. Inherent with self-reporting and implementation in a community setting, a number of fields had missing data. Due to this study being a secondary data analysis, it was not possible to contact participants to complete the missing fields. Since TCDS is a six week program, it is possible that results may have been influenced by other factors during that time, such as visits to health care providers.

There are also strengths of the study that should be acknowledged. By using an evidence-based program, we are able to be more certain of our results that the program is affecting the outcomes observed. The use of existing validated measures allows us to be sure that we are measuring the concepts we set out to measure. The diversity amongst the agencies delivering TCDS and participants increases the generalizability of results to the general population. Between those who completed or did not complete (attending less than four of six sessions) the program, and participants with blank data compared to those with complete data, no significant differences were found.

Since Hispanics suffer disproportionately from chronic disease, efforts should be made to decrease the disparities of prevalence and severity. Findings from this study show that participants improved across all measures, although some were not statistically significant. Since some measures were not found to be significant, program adaptation specific to the culture and needs of the Hispanic subgroups of South Florida might be warranted to see if outcomes may improve. Additional research should also evaluate the effectiveness of TCDS when translated by community agencies, and in different Hispanic cultures throughout the United States.

Figure 4.1 Flow diagram showing participant eligibility for analysis, TCDS

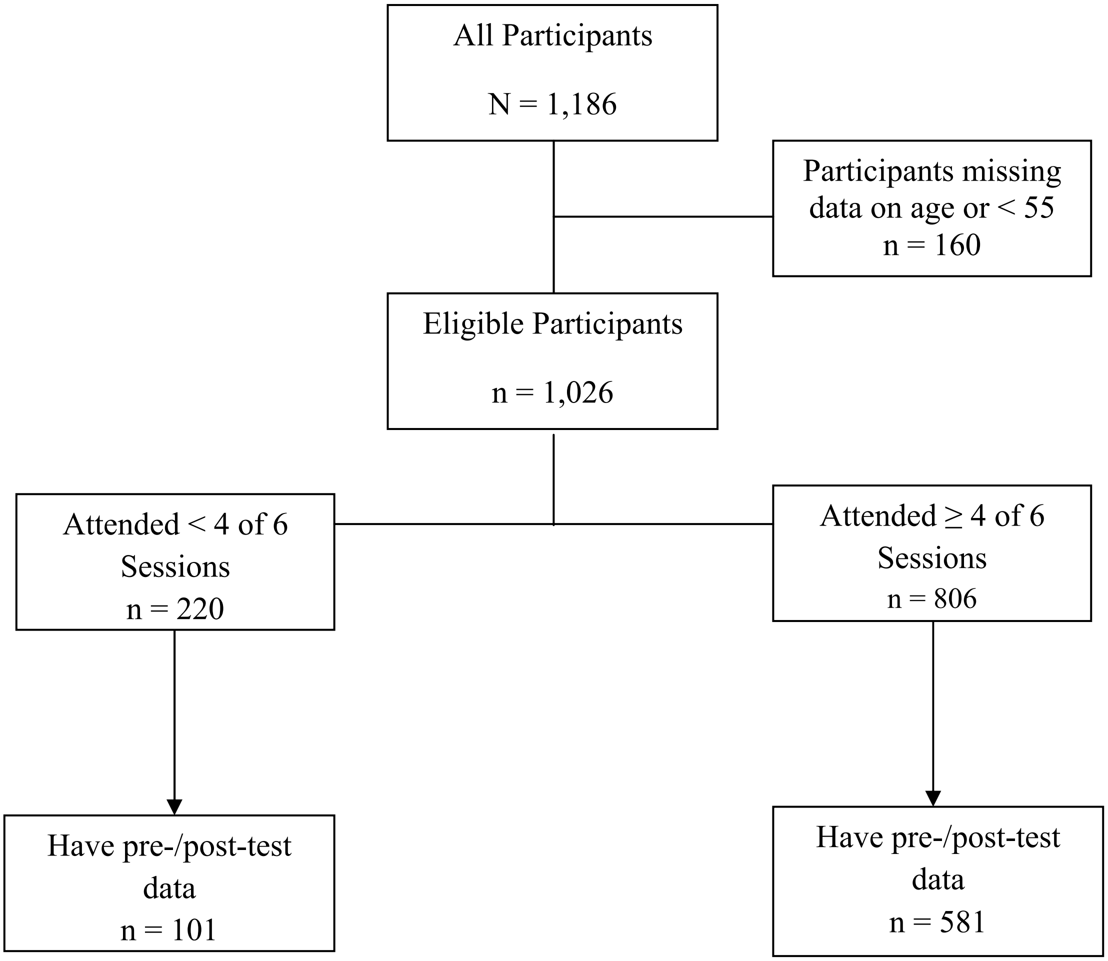

Table 4.1 Baseline Demographic Characteristics for TCDS Participants

	All Eligible Participants	**< 4 of 6 Sessions**	**≥ 4 of 6 Sessions**	***P*-value**
N	682	101	581	
	Mean (SD)	Mean (SD)	Mean (SD)	t-Test
Mean age	76.45 (8.69)	76.49 (9.18)	76.44 (8.61)	.961
Mean number of chronic diseases	1.99 (1.07)	2.17 (1.11)	1.95 (1.06)	.082
	n (%)	n (%)	n (%)	Chi-Square[a]
Gender				.390
Female	566 (83.0%)	87 (86.1%)	479 (82.4%)	
Male	107 (15.7%)	13 (12.9%)	94 (16.2%)	
County				.135
Broward	261 (38.3%)	15 (14.9%)	123 (21.2%)	
Miami-Dade	533 (78.2%)	85 (84.2%)	448 (77.1%)	
Marital Status				.365
Married/Partnered	261 (38.3%)	35 (34.7%)	226 (38.9%)	
Single/Not Partnered	407 (59.7%)	65 (64.4%)	342 (58.9%)	
Disabled				.389
Yes	63 (9.2%)	8 (7.9%)	55 (9.5%)	
No	274 (40.2%)	25 (24.8%)	249 (42.9%)	
Income				.081
<$15,000	428 (62.8%)	61 (60.4%)	367 (63.2%)	
≥ $15,000	51 (7.5%)	12 (11.9%)	39 (6.7%)	
Number in Household				.037
Lives Alone	415 (60.9%)	52 (51.5%)	363 (62.5%)	
Lives with Others	267 (39.1%)	49 (48.5%)	218 (37.5%)	
Education Level				.181
Less than High School	262 (38.4%)	32 (31.7%)	230 (39.6%)	
High School	193 (28.3%)	37 (36.6%)	156 (26.9%)	
Some College	79 (11.6%)	10 (9.9%)	69 (11.9%)	
College Graduate	93 (13.6%)	16 (15.8%)	77 (13.3%)	

[a] Pearson chi-square, two-tailed

Table 4.2 Baseline health status and health care utilization values for TCDS participants

	All Eligible Participants	**< 4 of 6 Sessions**	**≥ 4 of 6 Sessions**	***P*-value[a]**
N	682	101	581	
	Mean (SD)	Mean (SD)	Mean (SD)	
Self-rated health (1-5, ↓ = better)	3.22 (.89)	3.34 (.82)	3.19 (.90)	.123
Poor Physical Health Days (in the past 30)	5.75 (9.26)	4.47 (7.41)	5.97 (9.54)	.142
Poor Mental Health Days (in the past 30)	4.65 (9.04)	4.07 (8.82)	4.76 (9.08)	.492
Days where Activities were Prevented (in the past 30)	3.53 (7.88)	2.58 (6.46)	3.69 (8.09)	.203
Communication with Physician (0-5, ↑=better)	2.35 (1.45)	2.23 (1.39)	2.37 (1.46)	.374
MD visits (*n* in past 6 months)	2.75 (2.54)	2.63 (2.66)	2.77 (2.52)	.609
ER visits (*n* in past 6 months)	.21 (.75)	.11 (.43)	.22 (.80)	.174
Times hospitalized (*n* past 6 months)	.18 (1.04)	.05 (.34)	.20 (1.11)	.194
Days in hospital (*n* past 6 months)	.50 (3.00)	.16 (1.09)	.57 (3.23)	.221
Level of Fatigue (0-10, ↓=better)	3.12 (2.99)	3.44 (2.95)	3.06 (3.00)	.251
Level Shortness of Breath (0-10, ↓=better)	1.94 (2.72)	1.48 (2.51)	2.02 (2.75)	.069

Level of Pain (0-10, ↓=better)	3.47 (3.30)	3.12 (3.19)	3.53 (3.32)	.259
Level of Frustration (0-10, ↓=better)	2.00 (2.65)	1.51 (2.25)	2.09 (2.70)	.052

[a] Independent-Samples t-test

Table 4.3 Change in outcomes from baseline to six weeks for all attendance, TCDS, N = 682

	n	Baseline	6 Weeks	Δ	*P*
		Mean (SD)	Mean (SD)	Mean (SD)	
Self-Efficacy to Manage Disease (1-10, ↑=better)	664	6.75 (2.66)	8.05 (2.16)	1.30 (2.94)	.006
Self-Efficacy to Manage Emotions (1-10, ↑=better)	637	6.66 (2.88)	8.11 (2.40)	1.45 (3.30)	.162
Self-Efficacy to use mental and physical techniques to manage symptoms (1-10, ↑=better)	641	6.02 (3.27)	8.21 (2.25)	2.19 (3.64)	.787
Self-Efficacy to Communicate with Physician (1-10, ↑=better)	643	7.90 (2.60)	8.73 (2.12)	0.83 (2.81)	.480
Social/role activities limitations (0-4, ↑= better)	655	3.15 (1.05)	3.20 (1.08)	0.05 (1.28)	.001
Time Stretching (0-4, ↑= more time)	639	1.08 (1.20)	1.77 (1.29)	0.69 (1.54)	.062
Time Walking (0-4, ↑= more time)	599	1.43 (1.35)	1.98 (1.36)	0.55 (1.40)	.016
Time Other Aerobics (0-4, ↑= more time)	575	0.43 (0.95)	0.88 (1.33)	0.45 (1.39)	.005

Table 4.4 Change in outcomes from baseline to six weeks for ≥ 4 sessions, TCDS, N = 581

	n	Baseline	6 Weeks	Δ	*P*
		Mean (SD)	Mean (SD)	Mean (SD)	
Self-Efficacy to Manage Disease (1-10, ↑=better)	565	6.73 (2.68)	7.99 (2.22)	1.26 (2.98)	.020
Self-Efficacy to Manage Emotions (1-10, ↑=better)	544	6.65 (2.88)	8.05 (2.45)	1.40 (3.38)	.206
Self-Efficacy to use mental and physical techniques to manage symptoms (1-10, ↑=better)	549	6.00 (3.25)	8.14 (2.32)	2.14 (3.73)	.595
Self-Efficacy to Communicate with Physician (1-10, ↑=better)	552	7.86 (2.60)	8.64 (2.22)	0.78 (2.86)	.319
Social/role activities limitations (0-4, ↑= better)	560	3.16 (1.06)	3.19 (1.10)	0.03 (1.31)	.001
Time Stretching (0-4, ↑= more time)	543	1.07 (1.21)	1.75 (1.31)	0.68 (1.58)	.202
Time Walking (0-4, ↑= more time)	510	1.47 (1.36)	2.03 (1.36)	0.56 (1.45)	.022
Time Other Aerobics (0-4, ↑= more time)	496	0.41 (0.91)	0.92 (1.34)	0.51 (1.40)	.013

Table 4.5 Change in outcomes from baseline to six weeks for < 4 sessions, TCDS, N = 101

	n	Baseline	6 Weeks	Δ	*P*
		Mean (SD)	Mean (SD)	Mean (SD)	
Self-Efficacy to Manage Disease (1-10, ↑=better)	99	6.84 (2.55)	8.40 (1.77)	1.56 (2.73)	.141
Self-Efficacy to Manage Emotions (1-10, ↑=better)	93	6.72 (2.88)	8.45 (2.08)	1.73 (2.78)	.658
Self-Efficacy to use mental and physical techniques to manage symptoms (1-10, ↑=better)	92	6.28 (3.38)	8.61 (1.77)	2.33 (3.14)	.419
Self-Efficacy to Communicate with Physician (1-10, ↑=better)	91	8.16 (2.60)	9.27 (1.18)	1.11 (2.47)	.213
Social/role activities limitations (0-4, ↑= better)	95	3.13 (1.01)	3.22 (1.02)	0.09 (1.07)	.047
Time Stretching (0-4, ↑= more time)	96	1.15 (1.18)	1.89 (1.19)	0.74 (1.24)	.021
Time Walking (0-4, ↑= more time)	89	1.24 (1.31)	1.69 (1.34)	0.45 (1.08)	.711
Time Other Aerobics (0-4, ↑= more time)	79	0.52 (1.16)	0.66 (1.24)	0.14 (1.31)	.501

Table 4.6 Comparison of Outcomes between Completer Groups, TCDS

	All Attendance	< 4 Sessions	≥ 4 Sessions	*P*[a]
	N = 682	N = 101	N = 581	
	Mean Δ (SD)	Mean Δ (SD)	Mean Δ (SD)	
Self-Efficacy to Manage Disease	1.30 (2.94)	1.56 (2.73)	1.26 (2.98)	.373
Self-Efficacy to Manage Emotions	1.45 (3.30)	1.73 (2.78)	1.40 (3.38)	.327
Self-Efficacy to use mental and physical techniques to manage symptoms	2.19 (3.64)	2.33 (3.14)	2.14 (3.73)	.586
Self-Efficacy to Communicate with Physician	0.83 (2.81)	1.11 (2.47)	0.78 (2.86)	.278
Social/role activities limitations	0.05 (1.28)	0.09 (1.07)	0.03 (1.31)	.651
Time Stretching	0.69 (1.54)	0.74 (1.24)	0.68 (1.58)	.722
Time Walking	0.55 (1.40)	0.45 (1.08)	0.56 (1.45)	.547
Time Other Aerobics	0.45 (1.39)	0.14 (1.31)	0.51 (1.40)	.028

[a] Independent-samples t-test

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Chapter 5

Manuscript 3: Correlates of Program Completion for Older Adults in the Chronic Disease Self-Management Program and Tomando Control de su Salud

Introduction

Due to the increasing number of people over the age of 65 and increasing health care costs, self-management of chronic conditions by older adults is an important public health priority (McDonald, Rogers, & Macdonald, 2008). The current health care system lacks the necessary resources to adequately treat the rising prevalence of chronic disease as it is geared towards providing acute care (McDonald et al., 2008; Bodenheimer, Lorig, Holman, & Grumbach, 2002), causing older adults to be faced with managing their own diseases (Grey, Knafl, & McCorkle, 2006; Holman & Lorig, 2000). Unfortunately, many are not able to manage their conditions effectively, with African Americans and Hispanics reporting lower levels of symptom management self-efficacy (Bethell, Lansky, & Fiorillo, 2001).

The evidence-based Chronic Disease Self-Management Program (CDSMP) has been proven to be effective in achieving significant, long-term, improvements in patient self-efficacy, health behavior, social/role limitations, health care utilization, and chronic disease symptoms in both randomized control trials (Lorig, Ritter, & Jacquez, 2005; Lorig et al., 2001; Lorig et al., 1999) and a translational study with HMO patients (Lorig, Sobel, Ritter, Laurent, & Hobbs, 2001). Tomando Control de su Salud (TCDS) is the culturally tailored version of CDSMP for Hispanic populations, and has been proven effective in a controlled trial (Lorig, Ritter, & Gonzalez, 2003)

Improving self-efficacy is a key component and goal of both CDSMP and TCDS. While many people diagnosed with a chronic disease know the changes that they need to make, low self-efficacy acts as a barrier to fully managing their diseases (Farrell, Wicks, & Martin, 2004). Baseline and changes in self-efficacy levels can impact a person's future health status (Lorig, Gonzalez, & Ritter, 1999; Bandura, 1997). To improve self-efficacy, CDSMP and TCDS use performance mastery, modeling, interpretation of symptoms, and social persuasion (Bandura, 1997), and encourages participants to self-tailor by providing the knowledge of what to do and the skill set and self-confidence to actually do it (Lorig & Holman, 2003).

For health promotion programs to be effective, participants must complete programs or at least receive the minimum effective dose (Cross & West, 2011; Speller, Wimbush, & Morgan, 2005). Demographic and psychosocial factors have been shown to influence the likelihood of health promotion program completion. Younger age is associated with program attrition, and is thought to be the result of placing other social activities at a higher priority and having a lower perceived benefit from the program (Honas, Early, Frederickson, & O'Brien, 2003; Vanable, Carey, Carey, & Maisto, 2002; Frack, Woodruff, Candelaria, & Elder, 1997). Lower socioeconomic status is associated with program attrition (Radler & Ryff, 2010; Jancey et al., 2007) as is a lower level of education (Radler & Ryff, 2010; Winslow, Bonds, Wolchik, Sandler, & Braver, 2009; Obasanjo & Kumwenda, 2009). Race is also a predictor of attrition, with African Americans and Hispanics being more likely to not complete a health promotion program compared to White participants (Radler & Ryff, 2010; Langford et al., 2010; Coatsworth, Duncan, Pantin, & Szapocznik, 2006). Compared to women, men are more likely to not complete a program (Radler & Ryff, 2010; Jancey et al., 2007). Marital status is also associated with health promotion program attrition with widows and widowers (Radler & Ryff, 2010) and those separated or divorced (Martin & Sinden, 2001) being less likely to complete a program. Individuals who self-reported health as poor or fair are also less likely to complete a health promotion program (Radler & Ryff, 2010; Merrill, Bowden, & Aldana, 2010; Jancey et al., 2007). Additionally, lower self-efficacy has also been associated with attrition (Jancey et al., 2007; McAuley, 1993).

Limited research exists that has examined which factors may influence completion of CDSMP or TCDS. Several studies have examined outcome differences between completers and non-completers (Lorig et al., 2003; Lorig et al., 2001; Lorig et al., 1999). A 2001 study of CDSMP participants, found significant differences between completers and non-completers at one year for self-rated health, social/role activities, energy/fatigue levels, health distress, general self-efficacy to manage disease, and disability (Lorig et al., 2001). The same study found significant differences between completers and non-completers, at two years, for the baseline values of education level, social/role activities, health distress, self-rated health, disability, and energy/fatigue levels (Lorig et al., 2001). Studies of TCDS found non-completers at one year to have had a lower level of self-efficacy at baseline (Lorig et al., 2003) and non-completers at six months to have baseline values of fewer minutes of aerobic exercise, a higher level of social/role activity limitation, greater health distress, and higher levels of fatigue compared to completers (Lorig et al., 1999).

The Health Foundation of South Florida funded community agencies to deliver CDSMP and TCDS throughout South Florida as part of the Healthy Aging Regional

Collaborative (HARC). A four-day (20 hour), program-specific training was required of all instructors who were then paired with an experienced instructor for their first workshop (Stanford Patient Education Research Center, 1993). Instructors were required to have previous experience in chronic disease management as either a health care professional or peer. To maintain fidelity, instructors were required to follow the presentation order and scripts laid out in the Leader's Manual. Six, 2.5 hour classes were offered once a week for a total of six weeks. Agencies and instructors were encouraged to share strategies and seek best practices from each other.

Due to the lack of studies evaluating the correlation between participant characteristics and program completion for CDSMP and TCDS, the purpose of this investigation is to identify demographic, health status, and psychosocial factors that may predict the likelihood of program completion by older adults enrolled in CDSMP and TCDS.

Methods

Setting and Population

Seven agencies offered 108 CDSMP workshops throughout Broward, Miami-Dade, and Monroe Counties, at 81 sites, and eight agencies offered 82 TCDS workshops throughout Broward and Miami-Dade Counties at 62 sites from 10/1/2008 - 12/31/2010. The types of agencies offering CDSMP and TCDS included community service agencies/health clinics targeting older adults, one hospital, and one county-level Elderly and Veterans Affairs department. Sites where workshops were offered included community centers, churches, nursing homes, residential community clubhouses, and health clinics.

Data Collection

Demographic and baseline surveys were completed by participants prior to the beginning of the first class. Surveys were administered by workshop instructors who offered assistance in clarifying questions, reading questions, and writing responses for those participants who were unable to do so themselves. Following the sixth session, agency staff entered participant data into an online database. An evaluation team, hired by the HARC, verified data entry using the original forms.

Measures

Measures used in the investigation were consistent with other studies of CDSMP and TCDS. Measures chosen evaluate health status, self-efficacy, and health behaviors. Detailed examples of questions used at baseline are displayed in Table A.1.

Health Status

Several measures were used to assess health status. A single-item scale adopted from *The National Health Interview Survey* participants self-rated their current health (National Center for Health Statistics, 1991). This measure has a previously reported test-retest reliability of .92 (Lorig et al., 1996). Additionally, using modified visual-analogue scale having 10 histograms of different heights and shading intensities, participants were asked to rate their level of fatigue in the previous two weeks. The scale has a previously reported test-retest reliability of .64 and a correlation value of .72 with the original version of the pain question (Lorig et al., 1996; Gonzalez, Stewart, Ritter, & Lorig, 1995).

Health Services Utilization

Health care utilization was evaluated using the number of visits to physicians during the past six months and had a previously reported test-retest reliability of .76 (Lorig et al., 1996). This measure is considered to be representative of health care utilization, following validation against medical charts in a previous study (Lorig et al., 1996).

Self-Management Behaviors

Social/role activities limitations were assessed using a Likert response scale for the four circumstance scenarios of normal social activities, recreational activities, household chores, and errands. To be included in analysis, participants were required to answer at least three of the four items. The scale score was the average across all answered items. Chronbach's alphas for the four items were .92 for CDSMP and .93 for TCDS. The measure had a previously reported internal-consistency reliability of .91 and a test-retest reliability of .68 (Lorig et al., 1996).

Self-Efficacy

A three item scale, modified from an original five item scale, was used to assess self-efficacy to manage disease. Participants were required to answer all three items to be included in analysis. Chronbach's alphas for the three items were .91 for CDSMP and .94 for TCDS. The original five-item scale had a previously reported range of item-scale correlations of .58-.79 and an internal-consistency reliability of .87 (Lorig et al., 1996). An average score for all three items was calculated.

Demographics

Each participant provided information on gender, age, race/ethnicity, income level, highest education level, marital status, disability status, household number, and county of residence.

Analysis

Participant data for the period 10/01/2008 - 12/31/2010 was extracted from an online database and provided by the Health Foundation of South Florida. For the purpose of this study, program completers were defined as attending at least four of the six workshop sessions offered (Lorig, 2011; Evaluation Center Texas A & M, 2008). Participants younger than 55 years old or missing data on age, were removed from the dataset (Figures 5.1 and 5.2). A secondary data analysis was performed using SPSS v.17 (IBM, 2009). Data was cleaned of outliers and values outside possible response limits. Counts, means, and standard deviations were obtained using frequency and descriptive data reports. Demographic and baseline data of program completers were compared to non-completers using the Pearson's chi-square test for categorical variables and independent-samples t-test for continuous variables. Variables with p-values $\leq .300$, in univariate analysis, were included in the final model (Hosmer & Lemeshow, 2000). Also included in the final model, regardless of significance were the variables of age, gender, race/ethnicity, income, and education levels (Hosmer & Lemeshow, 2000). Interaction terms were tested using univariate logistic regression and if $p \leq .150$, included in the final model (Hosmer & Lemeshow, 2000). For CDSMP, the baseline scored measure of self-efficacy to manage symptoms was converted into three categories using visual binning in SPSS to allow for more meaningful analysis. For TCDS, the baseline scored measures of self-efficacy to manage symptoms and social/role activity limitations were converted into four categories each using visual binning in SPSS. For TCDS, the variables of age, income, and education level were collapsed to ensure a cell count of at least 10. Two different models, one for CDSMP and another for TCDS, were developed using multivariate logistic regression, with the enter-method, to identify demographic and baseline measures that were significant correlates of completion. The enter-method was used over stepwise, forward, and backward entry due to a limited number of cases for some variables and the desire to include independent variables that, while not within the limits of being statistically significant, are known confounders (Brace, Kemp, & Snelgar, 2009). Intercepts were excluded from the final models as they were not found to be significant (Peng, Lee, & Ingersoll, 2002). Overall model significance was assessed using the Likelihood Ratio Test (LRT). Model goodness of fit was assessed using the Hosmer-Lemeshow goodness of fit test and classification tables. Based on previous studies, participants were divided into two groups based on the number of classes attended, less than four and at least four (K. Lorig, personal communication, August 26, 2011; Evaluation Center Texas A & M, 2008). Minimum sample size was calculated accounting for number of covariates using the formula $N=(10*k)/(p)$, where k is the number of covariates and p is the smallest proportion of cases in the sample (Peduzzi, Concato, Kemper, Holford, & Feinstein, 1996).

A total of 1,627 participants enrolled in CDSMP workshops between October 1, 2008 and December 31, 2010. Two hundred seventy one participants were excluded from analysis due to missing information on age or being younger than 55 years old. Participants eligible for inclusion in analysis totaled 1,356 (Figure 5.1). A total of 283

(21%) attended less than four classes, and 1,073 (79%) attended at least four of the six classes comprising a workshop. As a result of missing data, a total of 561 participants were included in the final logistic regression model. Sample size analysis showed that a minimum sample size of 429 was required when having nine variables in the logistic regression model and a sample proportion of .21.

A total of 1,026 participants enrolled in TCDS workshops between October 1, 2008 and December 31, 2010. One hundred sixty participants were excluded from analysis due to missing information on age or being younger than 55 years old. Participants eligible for inclusion in analysis totaled 1,026 (Figure 5.2). A total of 220 (21%) attended less than four classes, and 806 (79%) attended at least four of the six classes comprising a workshop. As a result of missing form data, a total of 579 participants were included in the final logistic regression model. Sample size analysis showed that a minimum sample size of 381 was required when having eight variables in the logistic regression model and a sample proportion of .21.

Results

CDSMP

Overall, participants in CDSMP were likely to be between the ages of 70 to 79, with an average age of 74 (±10.10). The majority of participants were female (80%), living in Broward County (58%), single (56%), White (46%), with an income less than $15,000 (33%), having completed only high school (26%), and not disabled (68%). The majority of participants had only a single chronic disease (38%), with the group average being 1.90 (±1.09). The number of participants living alone or living with others differed by only one percentage point, at 50% (Table 5.1). The subsets of participants attending less than four classes and those attending at least four, both followed the overall trend of demographic factors for all participants (Table 5.1). Baseline health status and healthcare utilization values for those attending less than four classes were all better than those reported for participants attending at least four classes (Table 5.2).

Univariate and bivariate analysis did not identify any statistically significant differences between groups at $p \leq .05$. However, analysis did show five factors significant at $p \leq .300$ for inclusion in the final logistic regression model. These factors included county ($p = .134$), disability ($p = .120$), education level ($p = .174$), number of chronic diseases ($p = .290$), and self-efficacy to manage symptoms ($p = .182$) (Tables 5.2 and 5.3).

The LRT for the final model for CDSMP was found to be significant at $p < .001$. The model itself was found to have good fit using the Hosmer and Lemeshow goodness-of-fit test ($\chi^2 = 4.639$, $df = 8$, p-value = .795). Table 5.7 shows the classification table values. For the CDSMP model, sensitivity was 100% and specificity was 0%. The model resulted in a false positive rate of 20.1% and a false negative rate of 0%.

The logistic regression model results did not show any statistically significant correlations between demographic and psychosocial factors to program completion. Trends for categorical variables were identified and are shown in Table 5.6. Females were slightly more likely, compared to males, to attend at least four sessions (OR=1.15, 95% CI: .70-1.89). Participants younger than 80 years old were 1.3-1.6 times more likely than those aged 80 and over, to attend at least four sessions, with those in the age group 60-69 having the largest odds ratio. (OR=1.57, 95% CI: .91-2.71). Regarding race and ethnicity, Hispanic/Latino (OR=1.42, 95% CI: .62-3.25) and Haitian (OR=1. 77, 95% CI:

.57-5.51) participants were more likely to attend at least four sessions compared to white participants. African Americans were less likely, compared to white, to attend at least four sessions (OR=0.924, 95% CI: .54-1.57). Participants living in Broward County (OR=1.34, 95% CI: .74-2.43) and Miami-Dade County (OR=1.51, 95% CI: .73-3.15) were found to be more likely to attend at least four sessions than those living in Monroe County. A negative trend was seen with increasing education levels. Compared to being a college graduate, participants with a less than high school education (OR=1.40, 95% CI: .70-2.79), those having completed high school (OR=1.33, 95% CI: .73-2.44), and participants with some college (OR=1.03, 95% CI: .59-1.82) were all positively correlated with attending at least four sessions, but showed decreased odds ratios as education level increased. No trend was established regarding income level. Participants earning \$15,000-\$24,999 (OR=1.67, 95% CI: .96-2.90), \$25,000-\$49,999 (OR=1.19, 95% CI: .65-2.18), and ≥ \$50,000 (OR=1.55, 95% CI: .64-3.71) were more likely than participants earning ≤ \$15,000 to attend at least four classes. Disabled participants were more likely than those who were not disabled to attend at least four sessions (OR=1.34, 95% CI: .78-2.28). A negative trend was observed with total number of chronic diseases. Participants with a single chronic disease (OR=1.46, 95% CI: .88-2.43) and two chronic diseases (OR=1.11, 95% CI: .66-1.87) were more likely to attend at least four sessions than participants with three or more chronic diseases. Mixed results were seen with regard to self-efficacy to manage symptoms. Participants with a score ≤ 5.67 were more likely (OR=1.33, 95% CI: .79-2.22) than those with a score ≥ 8.34 to attend at least four sessions. However, those with scores of 5.68-8.33 were just as likely as those with higher scores to attend at least four sessions (OR=1.0, 95% CI: .60-1.66).

TCDS

Overall, participants in TCDS were likely to be age 70 and over, with nearly equal distribution in age groups 70 to 79 and 80 and over, with an average age of 76 (±8.78). The majority of participants were female (82%), living in Miami-Dade County (80%), single (57%), white (58%) with an income less than $15,000 (59%), having completed only high school (42%), single/not partnered (57%), and not disabled (41%). The majority of participants had only a single chronic disease (35%), with the group average being 1.97 (±1.05). The subsets of participants attending less than four classes and those attending at least four, both followed the overall trend of demographic factors for all participants (Table 5.3). Baseline health status values for those attending at least four classes were all better than those reported for participants attending less than four classes (Table 5.4). Health care utilization, measured by the number of doctor's visits in the past six months, was less in those attending less than four classes (2.79 ± 2.63) compared to those attending at least four classes (2.91 ± 2.60)

Table 5.5 shows that univariate and bivariate analysis identified only two factors with statistically significant differences, county ($p = .001$) and number in household ($p = .045$). Analysis did show an additional three factors significant at $p \leq .300$ for inclusion in the final logistic regression model. These factors included income ($p = .085$), self-efficacy to manage symptoms ($p = .288$), and social role/activity limitations ($p = .234$) (Table 5.5).

The LRT for the final model for TCDS was found to be significant at $p < .001$. The model itself was found to have good fit using the Hosmer and Lemeshow goodness-of-fit test ($\chi^2 = 7.85$, $df = 7$, p-value = .448). Table 5.9 shows the classification table values. For the TCDS model, sensitivity was 99.6% and specificity was 0.8%. The model resulted in a false positive rate of 20.3% and a false negative rate of 66.7%.

The logistic regression model results showed that a relationship was only found for demographic factors. None of the psychosocial variables were predictive (Table 5.8). Compared to females, males were found to be 2.3 times more likely to attend at least four sessions (OR=2.31, 95% CI: 1.15-4.66, *p*=.018). Compared to participants from Miami-Dade County, participants from Broward County were 2.3 times as likely to attend at least four sessions (OR=2.32, 95% CI: 1.27-4.25, *p* = .006). Regarding the number in household, participants living alone were twice as likely as those living with others to attend at least four sessions (OR=1.99, 95% CI: 1.29-3.08, *p* = .002).

The remaining demographic and psychosocial factors did not show statistically significant results. Participants aged 69 or less were more likely (OR=1.51, 95% CI: .79-2.90), but those aged 70-79 were less likely (OR=.699, 95% CI: .44-1.10) to attend at least four sessions compared to participants aged 80 and older. A positive trend was seen with increasing education levels. Compared to having a less than high school education, participants with a high school education (OR=1.05, 95% CI: .64-1.71), those with some college (OR=1.55, 95% CI: .76-3.18), and participants having completed college (OR=1.60, 95% CI: .81-3.17) were all positively correlated with attending at least four sessions. Participants earning less than $15,000 were more likely (OR=1.51, 95% CI: .91-2.49) than those earning ≥ $15,000, to attend at least four sessions. No clear trend was observed for self-efficacy to manage symptoms and social role/activity limitations. Participants with a self-efficacy score ≥ 9.01 (OR=1.67, 95% CI: .89-3.12) and 6.68-9.00 (OR=1.49, 95% CI: .85-2.62) were more likely than those with a score ≤ 5.00 to attend at least four sessions. However, those with self-efficacy scores of 5.01-6.67 were less likely than those with a score ≤ 5.00 to attend at least four sessions (OR=.884, 95% CI: .55-1.77). Compared to participants with a social role/activity limitation score ≥ 2.51, participants with a score ≤ .50 (OR=1.15, 95% CI: .62-2.13) and 1.51-2.50 (OR=1.16, 95% CI: .56-2.43) were more likely to attend at least four sessions. Participants with a score of .51-1.50 were less likely to attend at least four sessions (OR=.88, 95% CI: .47-1.68).

Discussion

Older adults experience many barriers to self-management and are also at higher risk of attrition. During the process of aging, a decline in general health is expected (Deimling, Bowman, & Wagner, 2007; Thome, Esbensen, Dykes, & Hallberg, 2004) as are increased physical limitations (Clark et al., 1991). In addition to physical factors, mental factors also play a role. Negative beliefs by the individual can be a barrier to self-management as participants feel there is no reason to try new self-management techniques (Yeom & Heidrich, 2009; Levy, 2003). Knowing which demographic and psychosocial factors play a role in the likelihood of program completion can assist program designers and implementation staff to target these factors and increase retention rates and possibly improve program outcomes (Jancey et al., 2007; Prohaska, Peters, & Warren, 2000). For this study, as well as other studies evaluating CDSMP and TCDS, program completers were defined as attending at least four of the six sessions offered (Lorig, 2011; Evaluation Center Texas A & M, 2008). The purpose of this investigation was to identify demographic and psychosocial factors that may correlate with the likelihood of program completion by older adults enrolled in CDSMP or TCDS.

CDSMP

While not significant, two clear trends were identified in our analysis for the factors of education level and number of chronic diseases in predicting completion of CDSMP. Compared to participants having graduated college, all other participants were less likely to complete the program. The likelihood of program completion decreased with each higher level of education. This trend has also been found in other studies, with the possible explanation that those with higher education levels might feel they can seek out information on their own (Radler & Ryff, 2010; Winslow et al., 2009; Obasanjo & Kumwenda, 2009). Each additional chronic condition decreased the likelihood of program completion. This could be attributed to the fact that multiple chronic diseases require more effort by the person to control and may hinder the ability and or desire to socially interact and attend classes (Lorig et al., 2001; Lorig et al., 2001). In contrast to this theory however, another study found that the number of chronic diseases had no correlation with the likelihood of program completion (Warren-Findlow, Prohaska, & Freedman, 2003).

The covariates of age, gender, race/ethnicity, and income were included in the model since they are established confounders (Steiner, Cook, Shadish, & Clark, 2010). Like univariate analyses, multivariate findings indicate these variables were not significant predictors of completion. Compared to participants age 80 or older, all other age groups were more likely to complete CDSMP, with odds ratios ranging from 1.32-1.57, although no trend was identified. Although age was non-significant, the finding can be accounted for since younger participants have better overall health or fewer barriers to attending class.

Findings also indicate that females were just slightly more likely than males (OR=1.15, 95% CI: .70-1.89, *p* = .575) to complete CDSMP, however findings were non-significant. When compared to other studies, it appears that females are more likely to complete (Radler & Ryff, 2010). It is not clear why this study did not achieve the same results. One possibility might be that there were not sufficient males in the sample size thus reducing the variance to detect a significant difference. This is common scenario as males tend to participate less often in health promotion programs (Lerman & Shemer, 1996).

In this study we found that Hispanic (OR=1.42, 95% CI: .62-3.25, *p* = .406) and Haitian (OR=1.77, 95% CI: .57-5.51, *p* = .323) participants were more likely than white, non-Hispanic participants to complete CDSMP. These findings stand in contrast to established research that has found minorities more likely to not complete programs due to cultural mistrust, disenfranchisement, limited representation among delivering staff (Langford et al., 2010; Brooks et al., 2008). African American participants were only slightly less likely to complete CDSMP (OR=.92, 95% CI: .54-1.57, *p* = .769) compared to white, non-Hispanic participants. A previous study by Greaney and colleagues (2006), also found no statistically significant association between race and program completion (*p* = 0.76) in univariate analysis (Greaney, Lees, Nigg, Saunders, & Clark, 2006).

Another finding was that participants with annual incomes greater than $15,000 were more likely to complete CDSMP, with odds ratios ranging from 1.19-1.67, although no trend between income levels was identified. This finding is in line with longer-term studies that found participants having higher income levels to be more likely to complete a program (Jancey et al., 2007; Frack et al., 1997). Also, participants who identified as frail/disabled were more likely than those not frail/disabled to complete CDSMP (OR=1.34, 95% CI: .78-2.28, *p* = .291). While those who are frail/disabled have been found to be more likely be lost to attrition in longer term studies due to physical health issues (Warren-Findlow et al., 2003), they also may have a greater perceived benefit that encourages them to attend.

Findings from this study show that levels of self-efficacy were inconclusive in predicting program completion for CDSMP. Compared to participants with a baseline self-efficacy value ≥ 8.34, participants with a value ≤ 5.67 were more likely to complete CDSMP (OR=1.33, 95% CI: .79-2.22, *p* = .286). This finding is in direct contrast to longer-term studies that found lower self-efficacy to be associated with program attrition (Jancey et al., 2007; McAuley, 1993). Those in the mid-range category baseline self-efficacy were just as likely, when rounded, as those in the high-range category to complete CDSMP (OR=1.0, 95% CI: .60-1.66, *p* = .994).

Past studies of CDSMP that have assessed differences between completer groups report p-values for differences in demographic factors and the baseline values of general health, self-efficacy, social/role activity limitations, fatigue, and health distress, but fail to provide mean group values. However, these comparisons are for time periods ranging from four months to two years, compared to our study definition of a completer attending at least four out of six sessions. No studies are available that compare demographic factors and psychosocial factor values at baseline between completer groups during the six weeks of CDSMP program instruction. While many demographic, psychosocial, and health status measures were found to be significantly different between completer groups at baseline in these studies (Lorig et al., 2001; Lorig et al., 1999), our study found no significant difference between those attending less than four sessions and those attending at least four sessions. Our findings are supported by one study by Lorig et. al., in 2005 that evaluated baseline differences among completers and non-completers at four months and again at one year (Lorig et al., 2005). The lack of significant differences may be due in part to the fact that six weeks is too short a time period for these factors to have an effect on program completion. Another reason for no significant difference between groups might be that the two groups are too similar in demographic composition, as evidenced by similar percentage values (Table 5.1).

TCDS

Logistic regression identified three covariates that were significant predictors of program completion. These included gender, county of residence, and number in household. Compared to females, males were found to be 2.3 times more likely to attend at least four sessions (OR=2.31, 95% CI: 1.1545-4.663, $p = .018$). This finding is supported by a study evaluating an older adult exercise program (OR=1.19, 95% CI: 0.63-2.23), although the odds ratio is not statistically significant (Jancey et al., 2007). In contrast, a longitudinal survey study found that females were more likely to complete (OR=1.47, 95% CI: 1.21-1.77, $p<.001$) (Radler & Ryff, 2010). However, these studies did not have a predominant Hispanic population and did not examine completion based on actual program attendance. Compared to participants from Miami-Dade County, participants from Broward County were 2.3 times as likely to attend at least four sessions (OR=2.32, 95% CI: 1.265-4.246, $p= .006$). Additional analysis, using Pearson chi-square tests, was conducted to determine if significant differences existed between participants based on county of residence. Statistically significant differences were observed for age (*p* = .022), gender (*p* = .042), number in household (*p* = .003), marital status (*p* = .024), and self-efficacy to manage symptoms (*p* = .005). Compared to Miami-Dade County participants, Broward County participants were more likely to be in the age group 70-79, single/not partnered, female, and have a self-efficacy score ≥ 9.01. The sample of Broward County participants living alone and living with others was split nearly evenly, while Miami-Dade County participants were more likely to live alone. Due to the much smaller proportion of TCDS participants in Broward County (17.6%), as compared to Miami-Dade County (80.2%), it is possible that the result may be biased.

Regarding the number in household, participants living alone were twice as likely as those living with others to attend at least four sessions (OR=1.99, 95% CI: 1.290-3.084, *p* = .002). This finding stands in contrast to results of a longitudinal survey study that showed participants who were married/partnered were 1.5 times more likely that those not married/partnered to complete the study (Radler & Ryff, 2010). While social support in the home has been documented as being beneficial to activity encouragement, it can also act as a barrier if the other person in the household relies on the participant for care or other needs (Jancey et al., 2007). Due to the age of the population, it is likely that others in the household would also suffer from chronic disease. The responsibility of caring for others in the household may both directly and indirectly prevent the participant from attending classes.

The other covariates of age, education level, income, self-efficacy to manage symptoms, and social/role activity limitations were not found to be statistically significant in the model, as expected since they were not significant in univariate analysis. No clear trend could be identified amongst age groups since participants who were ≤ 69 years old were 1.5 times more likely (OR=1.51, 95% CI: .79-2.90, $p = .213$) than those ≥ 80 years old to complete the program, yet those in the age range 70-79 were less likely (OR=.70, 95% CI: .443-1.10, $p = .125$) to complete the program. This finding in supported since younger participants are more likely to have better general health and encounter fewer barriers related to attending classes.

While not significant, findings from this study identified a trend where an increase in level of education was associated with an increase in likelihood of program completion with odds ratios ranging from 1.05-1.60. This finding stands in direct contrast to other studies that found higher levels of education associated with program attrition (Radler & Ryff, 2010; Winslow et al., 2009; Obasanjo & Kumwenda, 2009). These studies were not mainly composed of Hispanic participants, so the results may not be comparable.

Findings showed that participants with an annual income of less than $15,000 were 1.5 times more likely (OR= 1.51, 95% CI: .91-2.49, $p = .109$) than participants with an annual income greater than or equal to $15,000 to complete TCDS. This finding is in contrast with a study of Hispanics that found lower income levels to be associated with program attrition at six months ($\chi^2 = 4.57, p < .01$) (Frack et al., 1997). Results of our study might be explained by the fact that TCDS was offered at sites that included low-income residential complexes and social service centers where participants did not have any expense related to attending the program, such as transportation costs.

Results of our study showed that, for TCDS, higher levels of self-efficacy to manage symptoms were positively associated with participants attending at least four sessions for those with scores of ≥ 9.01 (OR=1.67, 95% CI: .89-3.12, $p = .110$) and 6.68-

9.00 (OR=1.49, 95% CI: .85-2.62, *p* = .164). A study by Lorig et. al., in 2003, found that at one year, the only significant difference at baseline between those completing and not completing the study was self-efficacy to manage symptoms, with higher levels of self-efficacy being associated with program completion (Lorig et al., 2003). Higher self-efficacy would be associated with the participant believing that they are able to use and benefit from the skills taught in class, and therefore they would make a greater effort to attend.

We found no trend between levels of social/activity role limitations and program completion amongst participants. However, participants with low limitations, having a score greater than or equal to 3.50, were more likely (OR=1.15, 95% CI: .618-2.13, *p* = .663) than those with high limitations, having a score less than or equal to 1.49, to complete TCDS. This would be expected since those with fewer social limitations would encounter fewer barriers related to attending class.

While both CDSMP and TCDS target older adults and share the goal of improving self-management by increase self-efficacy, differences were observed amongst factors that may correlate with program completion. The fact that no single factor was significant for predicting program completion for CDSMP may be the result of completers and non-completers being homogenous. This homogeneity between groups may be the result of a program that is adequately designed for the older adult population. The trends of education level and number of chronic diseases being negatively correlated with program completion of CDSMP are consistent with participants across health promotion programs and are not unique to older adults. Interestingly, gender, county of residence, and number in the household were found to be significant correlates of program completion for TCDS, but not for CDSMP. These differences may exist based on cultural norms of gender and household practices. Caution must be taken when comparing correlates of completion between the two programs since they target culturally different populations. It should not be expected that each program would have the same correlates of completion.

This study was able to identify correlates and trends related to completion of CDSMP and TCDS. However, study limitations need to be acknowledged. Study participants were self-selected. This desire to enroll in a health promotion program to learn self-management skills may have biased attrition rates since those wanting to participate are more like to continue participating and caused the sample to not be representative of the general older adult population. All surveys were self-administered resulting in possible self-report and recall biases. No verification of participant responses took place. Also, many data fields were found to be blank, namely race/ethnicity and income. This is expected since the program was implemented in a real-world setting. As this was a secondary data analysis, it was not possible to follow up with participants. As both race/ethnicity and income were factors included in our logistic regression models for each program, the number of participants actually included in the model, compared to the total sample, is quite small. The length of time, six weeks, being evaluated by this study might be too short a time period for the factors assessed to play a significant role.

After acknowledging these limitations, the study does have notable strengths. By using an evidence-based program, there are many studies to compare results against and knowledge that the program works well across different populations. By using items and scales that had been validated, measurement accuracy increased and reduced internal validity threats associated with measurement. Since these programs were delivered by community agencies and not in controlled environments, the results obtained are more likely to be representative of other program translations. Also, since the programs were delivered by multiple agencies participating in a collaborative effort, in many locations throughout South Florida, it is likely that a representative cross-section of the older adult population was obtained, increasing the generalizability of results.

Conclusion

Chronic disease programs are a way to reduce morbidity and mortality, yet little is known about what factors may influence participation and attrition. Participant attrition is a significant problem in evidence-based health promotion programs as it results in participants not gaining knowledge and skills and program implementers wasting time and money. The ability to identify demographic and psychosocial factors that predict the likelihood of completion would allow program developers and implementation staff to tailor the program and target individuals at risk for attrition. For CDSMP, no single demographic, health status, or psychosocial factor was identified. For TCDS, gender, county of residence, and number in household may impact the likelihood of program completion. Future research could improve on the definition of completer groups for CDSMP and TCDS by evaluating a dose-response relationship, and then further evaluating which four of the six sessions might have the greatest impact on outcomes. Also, future research could investigate the underlying conditions that cause the identified covariates to impact program completion.

Table 5.1 Demographic profile of completers and non-completers, CDSMP

	All Eligible Participants	**< 4 of 6 Sessions**	**≥ 4 of 6 Sessions**	***p*-value**[a]
N	1,356	283	1,073	
	n (%)	n (%)	n (%)	
Age				.769
≤ 59	106 (7.8%)	25 (8.8%)	81 (7.5%)	
60 - 69	370 (27.3%)	72 (25.4%)	298 (27.8%)	
70 - 79	447 (33.0%)	97 (34.3%)	350 (32.6%)	
≥ 80	433 (31.9%)	89 (31.4%)	344 (32.1%)	
Gender				.612
Female	1,084 (79.9%)	229 (80.9%)	855 (81.0%)	
Male	249 (18.4%)	49 (17.3%)	200 (18.6%)	
County				.134
Broward	788 (58.1%)	172 (60.8%)	616 (57.4%)	
Miami-Dade	423 (31.2%)	76 (26.9%)	347 (32.3%)	
Monroe	127 (9.4%)	32 (11.3%)	95 (8.9%)	
Marital Status				.333
Married/Partnered	533 (39.3%)	118 (41.7%)	415 (38.7%)	
Single/Not Partnered	763 (56.3%)	152 (53.7%)	611 (56.9%)	
Disabled				.120
Yes	273 (20.1%)	48 (17.0%)	225 (21.0%)	
No	925 (68.2%)	203 (71.7%)	722 (67.3%)	
Race/Ethnicity				.492
African American	391 (28.8%)	78 (27.6%)	313 (29.2%)	
Haitian/Caribbean	71 (5.2%)	11 (3.9%)	60 (5.6%)	
Hispanic	113 (8.3%)	21 (7.4%)	92 (8.6%)	
White	620 (45.7%)	141 (49.8%)	479 (44.6%)	
Income				.404
<$15,000	449 (33.1%)	93 (32.9%)	356 (33.2%)	
$15,000 - $24,999	191 (14.1%)	30 (10.6%)	161 (15.0%)	
$25,000 - $49,999	144 (10.6%)	32 (11.3%)	112 (10.4%)	
>$50,000	56 (4.1%)	10 (3.5%)	46 (4.3%)	
Number in Household				.653
Lives Alone	670 (49.4%)	143 (50.5%)	527 (49.1%)	
Lives with Others	683 (50.4%)	139 (49.1%)	544 (50.7%)	
Education Level				.174
Less than High School	266 (19.6%)	51 (18.0%)	215 (20.0%)	
High School	349 (25.7%)	65 (23.0%)	284 (26.5%)	
Some College	328 (24.2%)	82 (29.0%)	246 (22.9%)	
College Graduate	314 (23.2%)	64 (22.6%)	250 (23.3%)	

Number of Chronic Diseases				.290
1	518 (38.2%)	105 (37.1%)	413 (38.5%)	
2	379 (27.9%)	87 (30.7%)	292 (27.2%)	
≥ 3	252 (18.6%)	45 (15.9%)	207 (19.3%)	
Self-Rated Health				.319
Excellent/Very Good	266 (19.6%)	52 (19.0%)	214 (19.9%)	
Good	554 (40.9%)	123 (45.1%)	431 (40.2%)	
Fair/Poor	388 (28.6%)	71 (26.0%)	317 (29.5%)	
Self-Efficacy to Manage Symptoms				.182
≥ 8.34	435 (32.1%)	91 (32.2%)	344 (32.1%)	
5.68 - 8.33	337 (24.9%)	78 (27.6%)	259 (24.1%)	
≤ 5.67	406 (29.9%)	72 (25.4%)	334 (31.1%)	

[a] Pearson chi-square, two tailed

Table 5.2 Baseline health status and health care utilization values for CDSMP participants

	All Eligible Participants	**< 4 of 6 Sessions**	**≥ 4 of 6 Sessions**	***p*-value**[a]
N	1,356	283	1,073	
	Mean (SD)	Mean (SD)	Mean (SD)	
Self-Efficacy to Manage Symptoms (1-10, ↑=better)	6.80 (2.55)	6.99 (2.50)	6.75 (2.57)	.065
MD visits (*n* in past 6 months)	3.55 (4.10)	3.50 (4.97)	3.69 (4.70)	.217
Social/Role Activities (0-4, ↑=better)	2.84 (1.18)	2.90 (1.15)	2.82 (1.19)	.841
Level of Fatigue (0-10, ↓=better)	3.89 (2.94)	3.88 (2.97)	3.90 (2.94)	.943

[a] Independent-samples t-test

Table 5.3 Demographic profile of completers and non-completers, TCDS

	All Eligible Participants	< 4 of 6 Sessions	≥ 4 of 6 Sessions
N	1,026	220	806
	n (%)	n (%)	n (%)
Age			
≤ 59	38 (3.7%)	9 (4.1%)	29 (3.6%)
60 - 69	207 (20.2%)	46 (20.9%)	161 (20.0%)
70 - 79	393 (38.3%)	86 (39.1%)	307 (38.1%)
≥ 80	388 (37.8%)	79 (35.9%)	309 (38.3%)
Gender			
Female	842 (82.1%)	182 (82.7%)	660 (81.9%)
Male	169 (16.5%)	36 (16.4%)	133 (16.5%)
County			
Broward	181 (17.6%)	22 (10.0%)	159 (19.7%)
Miami-Dade	823 (80.2%)	193 (87.7%)	630 (78.2%)
Marital Status			
Married/Partnered	404 (39.4%)	84 (38.2%)	320 (39.7%)
Single/Not Partnered	586 (57.1%)	127 (57.7%)	459 (56.9%)
Disabled			
Yes	101 (9.8%)	17 (7.7%)	84 (10.4%)
No	418 (40.7%)	74 (33.6%)	344 (42.7%)
*Race/Ethnicity**			
Black	19 (1.9%)	5 (2.3%)	14 (1.7%)
White	592 (57.7%)	134 (60.9%)	458 (56.8%)
Income			
<$15,000	609 (59.4%)	124 (56.4%)	485 (60.2%)
≥ $15,000	84 (8.2%)	24 (10.9%)	60 (7.4%)
Number in Household			
Lives Alone	638 (62.2%)	124 (56.4%)	514 (63.8%)
Lives with Others	388 (37.8%)	96 (43.6%)	292 (36.2%)
Education Level			
Less than High School	435 (42.4%)	91 (41.4%)	344 (42.7%)
High School	255 (24.9%)	60 (27.3%)	195 (24.2%)
Some College	113 (11.0%)	20 (9.1%)	93 (11.5%)
College Graduate	130 (12.7%)	30 (13.6%)	100 (12.4%)
Number of Chronic Diseases			
1	356 (34.7%)	67 (30.5%)	289 (35.9%)
2	285 (27.8%)	61 (27.7%)	224 (27.8%)
≥ 3	230 (22.4%)	49 (22.3%)	181 (22.5%)

* All respondents identified as being Hispanic

Table 5.4 Baseline health status and health care utilization values for TCDS participants

	All Eligible Participants	< 4 of 6 Sessions	≥ 4 of 6 Sessions
N	1,026	220	806
	Mean (SD)	Mean (SD)	Mean (SD)
Self-rated health (1-5, ↓ = better)	3.26 (.89)	3.33 (.82)	3.25 (.91)
Self-Efficacy to Manage Symptoms (1-10, ↑=better)	6.56 (2.63)	6.42 (2.43)	6.59 (2.68)
MD visits (*n* in past 6 months)	2.89 (2.60)	2.79 (2.63)	2.91 (2.60)
Social/Role Activities (0-4, ↑=better)	3.09 (1.08)	3.00 (1.08)	3.11 (1.08)
Level of Fatigue (0-10, ↓=better)	3.41 (3.05)	3.55 (2.96)	3.37 (3.08)

Table 5.5 Univariate and bivariate analysis of variables for consideration in the logistic regression model for TCDS

	< 4 of 6 Sessions	≥ 4 of 6 Sessions	*P*-value[a]
N	220	806	
	n (%)	n (%)	
Age			.794
≤ 69	55 (25.0%)	190 (23.6%)	
70 - 79	86 (39.1%)	307 (38.1%)	
≥ 80	79 (35.9%)	309 (38.3%)	
Gender			.928
Female	182 (82.7%)	660 (81.9%)	
Male	36 (16.4%)	133 (16.5%)	
County			.001
Broward	22 (10.0%)	159 (19.7%)	
Miami-Dade	193 (87.7%)	630 (78.2%)	
Marital Status			.740
Married/Partnered	84 (38.2%)	320 (39.7%)	
Single/Not Partnered	127 (57.7%)	459 (56.9%)	
Disabled			.836
Yes	17 (7.7%)	84 (10.4%)	
No	74 (33.6%)	344 (42.7%)	
Income			.085
<$15,000	124 (56.4%)	485 (60.2%)	
≥ $15,000	24 (10.9%)	60 (7.4%)	
Number in Household			.045
Lives Alone	124 (56.4%)	514 (63.8%)	
Lives with Others	96 (43.6%)	292 (36.2%)	
Education Level			.601
Less than High School	91 (41.4%)	344 (42.7%)	
High School	60 (27.3%)	195 (24.2%)	
College	50 (22.7%)	193 (23.9%)	
Number of Chronic Diseases			.657
1	67 (30.5%)	289 (35.9%)	
2	61 (27.7%)	224 (27.8%)	
≥ 3	49 (22.3%)	181 (22.5%)	
Self-Efficacy to Manage Symptoms			.288
≤ 5.00	66 (30.0%)	220 (27.3%)	
5.01 - 6.67	40 (18.2%)	135 (16.7%)	
6.68 - 9.00	45 (20.4%)	208 (25.8%)	
≥ 9.01	34 (15.5%)	157 (19.5%)	

Self-Rated Health			.415
Excellent/Very Good	26 (11.8%)	124 (15.4%)	
Good	72 (32.7%)	295 (36.6%)	
Fair/Poor	89 (40.5%)	313 (38.8%)	
Social/Role Activity Limitations			.234
0 - 1.49	22 (10.0%)	71 (8.8%)	
1.50 - 2.49	24 (10.9%)	98 (12.2%)	
2.50 - 3.49	54 (24.5%)	165 (20.5%)	
3.50 - 4.0	86 (39.1%)	383 (47.5%)	
Continuous Variables	Mean (SD)	Mean (SD)	*P*-value[b]
Self-Efficacy to Manage Symptoms	6.42 (2.43)	6.59 (2.68)	.416
MD Visits	2.79 (2.63)	2.91 (2.60)	.597
Social/Role Activities	3.00 (1.08)	3.11 (1.08)	.206
Level of Fatigue	3.55 (2.96)	3.37 (3.08)	.455

[a] Pearson chi-square, two-tailed

[b] Independent-samples t-test

Table 5.6 Logistic regression model results for CDSMP, n = 561

Variable	B	Standard Error	Wald χ^2	*P*	OR (95% CI)
Age					
≤ 59 years	.360	.384	.878	.349	1.433 (.675, 3.042)
60 – 69 years	.453	.277	2.663	.103	1.573 (.913, 2.709)
70 - 79 years	.278	.258	1.166	.280	1.321 (.797, 2.189)
≥ 80 years	(REF)		3.027	.388	
Gender					
Female	.142	.253	.315	.575	1.152 (.702, 1.891)
Male	(REF)				
Race/Ethnicity					
Hispanic/Latino	.350	.422	.690	.406	1.420 (.621, 3.246)
Haitian	.572	.579	.976	.323	1.772 (.570, 5.510)
African American	-0.079	.271	.086	.769	.924 (.543, 1.571)
White, non-Hispanic	(REF)		2.075	.557	
County					
Broward	.290	.304	.905	.341	1.336 (.736, 2.425)
Miami-Dade	.413	.374	1.215	.270	1.511 (.725, 3.146)
Monroe	(REF)		1.285	.526	
Education Level					
Less than high school	.334	.353	.896	.344	1.397 (.699, 2.792)
High School	.285	.309	.851	.356	1.330 (.725, 2.440)
Some College	.032	.289	.012	.912	1.032 (.586, 1.820)
College Graduate	(REF)		1.550	.671	
Income					
≥ $50,000	.436	.447	.951	.329	1.546 (.644, 3.709)
$25,000 - $49,999	.173	.309	.312	.576	1.189 (.648, 2.179)
$15,000 - $24,999	.514	.281	3.344	.067	1.671 (.964, 2.899)
< $15,000	(REF)		3.822	.281	
Frail/Disabled					
Yes	.289	.273	1.115	.291	1.335 (.781, 2.280)
No	(REF)				
Number of Chronic Diseases					
1	.381	.258	2.184	.139	1.463 (.883, 2.425)
2	.100	.267	.140	.709	1.105 (.655, 1.865)
≥ 3	(REF)		2.427	.297	
Self-Efficacy to Manage Symptoms					
≤ 5.67	.282	.264	1.136	.286	1.325 (.790, 2.224)
5.68 - 8.33	-0.002	.259	.001	.994	.998 (.600, 1.659)
≥ 8.34	(REF)		1.479	.477	

Table 5.7 Observed and predicted frequencies for CDSMP program completion by logistic regression, cutoff of 0.50

	Predicted		
Observed	Yes	No	% Correct
Yes	448	0	100.0
No	113	0	0.0
Overall % Correct			79.9

Note. Sensitivity = 100.0%. Specificity = 0.0%.
False positive = 20.1%. False negative = 0.0%.

Table 5.8 Logistic regression model results for TCDS, n = 579

Variable	B	Standard Error	Wald χ^2	*P*	OR (95% CI)
Age					
≤ 69 years	.413	.332	1.548	.213	1.512 (.788, 2.899)
70 - 79 years	-0.358	.233	2.354	.125	.699 (.443, 1.104)
≥ 80 years	(REF)		6.209	.045	
Gender					
Male	.838	.355	5.592	.018	2.313 (1.154, 4.663)
Female	(REF)				
County					
Broward	.841	.309	7.407	.006	2.318 (1.265, 4.246)
Miami-Dade	(REF)				
Education Level					
College	.470	.349	1.818	.178	1.600 (.808, 3.169)
Some College	.440	.365	1.451	.228	1.553 (.759, 3.178)
High School	.046	.251	.034	.854	1.047 (.640, 1.713)
Less than high school	(REF)		2.930	.403	
Income					
< $15,000	.411	.256	2.575	.109	1.508 (.913, 2.490)
≥ $15,000	(REF)				
Number in Household					
Lives alone	.690	.222	9.631	.002	1.994 (1.290, 3.084)
Lives with others	(REF)				
Self-Efficacy to Manage Symptoms					
≥ 9.01	.511	.320	2.558	.110	1.667 (.891, 3.119)
6.68 - 9.00	.400	.287	1.940	.164	1.492 (.850, 2.618)
5.01 - 6.67	-0.015	.297	.003	.960	.985 (.550, 1.765)
≤ 5.00	(REF)		3.840	.279	
Social/Role Activity Limitations					
≥ 3.50	.138	.316	.190	.663	1.148 (.618, 2.131)
2.50 - 3.49	-0.123	.328	.140	.708	.884 (.465, 1.682)
1.50 - 2.49	.151	.376	.160	.689	1.162 (.556, 2.429)
≤ 1.49	(REF)		1.117	.773	

Table 5.9 Observed and predicted frequencies for TCDS program completion by logistic regression, cutoff of 0.50

	Predicted		
Observed	Yes	No	% Correct
Yes	459	2	99.6%
No	117	1	0.8%
Overall % Correct			79.4%

Note. Sensitivity = 99.6%. Specificity = 0.8%.
False positive = 20.3%. False negative = 66.7%.

Figure 5.1 Flow diagram showing CDSMP participant eligibility for analysis

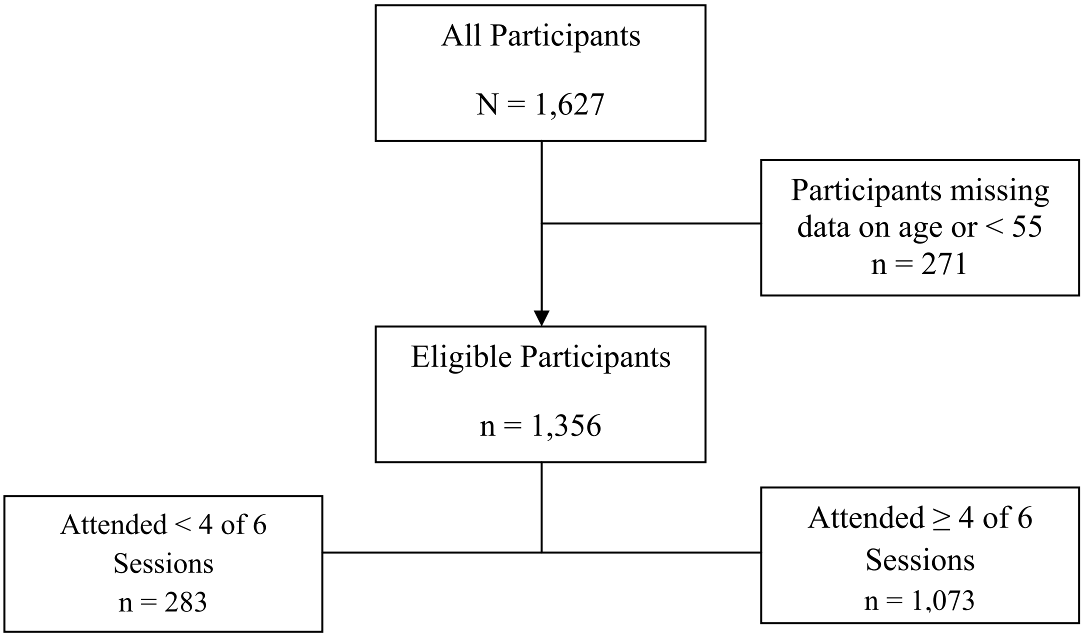
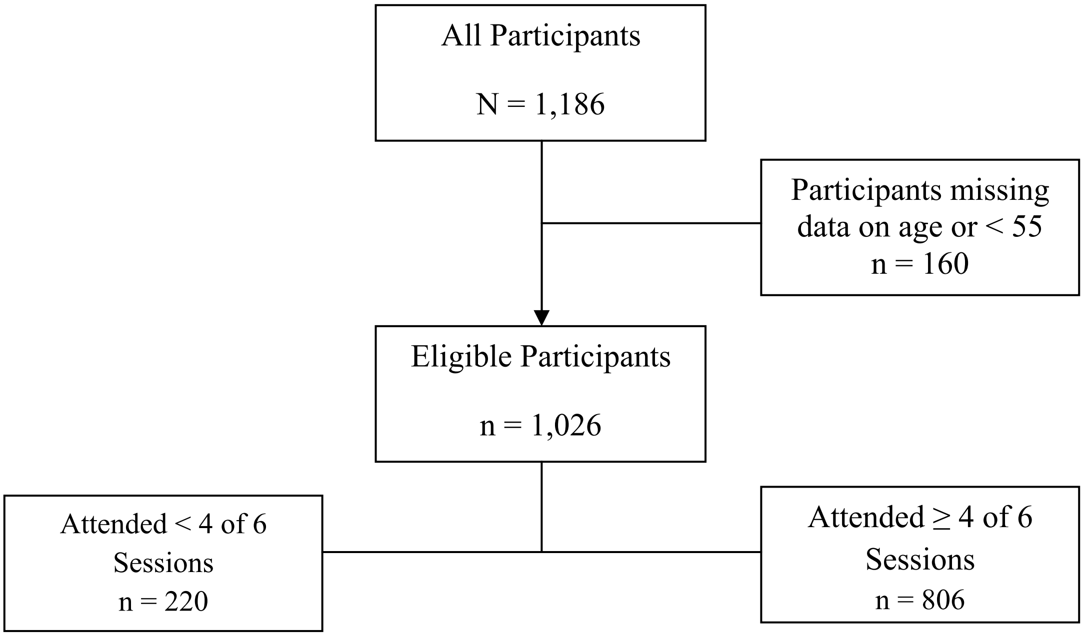


Figure 5.2 Flow diagram showing TCDS participant eligibility for analysis



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Chapter 6

Conclusion

The purpose of this investigation was two-fold. First, this investigation aimed to examine if Chronic Disease Self-Management Program (CDSMP) and Tomando Control de su Salud (TCDS), when implemented by multiple, community-based, agencies could increase self-efficacy regarding chronic disease management, decrease social activity/role limitations, and increase time spent exercising. Next, this study aimed to identify demographic, health status, and psychosocial factors, measured at baseline, that may correlate with the likelihood of program completion by older adults enrolled in CDSMP or TCDS.

Given that there is limited information about translating CDSMP and TCDS to practice settings by community agencies, the first part of this study focused on assessing program outcomes. Investigating the effectiveness of these programs, offered by multiple agencies, across a large geographic location, can aid in the decision of other agencies and funders considering the same. By employing a collaborative effort, offering agencies are able to share resources, both tangible and intangible, knowledge on best practices, and reach different populations more easily. Due to the aging of the adult population in the United States and chronic disease prevalence rising, the need to teach older adults to successfully manage chronic disease should be a priority. Collaborative approaches may be an effective way to deliver health promotion programs to a large cross-section of a population by reducing common barriers to implementation.

Self-efficacy is the level of confidence a person has regarding their ability to perform a certain behavior (Bandura, 1997; Bandura et al., 1977) and has long been realized as being a crucial component to successful disease self-management (Lorig & Holman, 2003; Bandura, 1977a). This is due to the fact that behavior change is a main component of chronic disease self-management (Lorig & Holman, 2003). Increasing knowledge, through the instruction of disease self-management behaviors, is inadequate if the person does not believe that they can engage in the behaviors (Lorig & Holman, 2003). CDSMP and TCDS target increasing self-efficacy in the areas of disease management, emotion management, communication with a physician, and the use of learned techniques through modeling, self-directed accomplishments (weekly action plans), and education. By increasing self-efficacy through the completion of action plans, participants are able to have a greater self-efficacy in general to perform other tasks that they might have not attempted before (Bandura et al., 1977; Bandura et al., 1975). Participants in both CDSMP and TCDS showed improvements over baseline, with those in TCDS having a larger magnitude of change. For both programs, a change in self-efficacy to manage disease was found to be statistically significant, but a change in self-efficacy to manage emotions was found to be significant only among CDSMP participants. This measure to assess self-efficacy to manage emotions has not been tested for validity amongst English or Spanish-speaking participants.

Social activity and maintenance of activities of daily living (ADL) play a significant role in overall health. Social activity provides older adults with emotional support and a sense of meaning (Yen, Shim, Martinez, & Barker, 2012; Leedahl, Koenig, & Ekerdt, 2011; Cattan, Hogg, & Hardill, 2011). Social activity among older adults has been correlated with maintenance of cognitive function (Fung, Leung, & Lam, 2011; James, Wilson, Barnes, & Bennett, 2011), increased health-related quality of life

(HRQoL) (Imayama, Plotnikoff, Courneya, & Johnson, 2011), increased self-rated physical health (Cornwell & Waite, 2009), decreased mortality (Seeman, 1996), and decreased susceptibility to dementia (Fratiglioni, Paillard-Borg, & Winblad, 2004). Many individual factors are included under the term ADL, but can be grouped based on self-care tasks (personal hygiene, self-feeding, dressing and undressing, etc.) (Katz, 1983) and instrumental activities (housework, managing money, use of technology, etc.) (Lawton & Brody, 1969). As people live longer with chronic diseases, the rates of morbidity and ADL disability are expected to increase (Fuller-Thomson, Yu, Nuru-Jeter, Guralnik, & Minkler, 2009). A decline in ADLs can significantly impact HRQoL as it results in a loss of independence (Vest, Murphy, Araujo, & Pisani, 2011; Fagerstrom & Borglin, 2010). Social interaction is a significant component of CDSMP and TCDS. The structure of program instruction encourages participants to interact with each other and the instructors through the use of modeling, role-playing, and sharing of ideas and experiences through brainstorming. In addition to interaction in the class setting, participants are encourage to choose a new buddy each week to follow up with and encourage completion of their individual action plans. Maintenance of ADLs is encouraged in each program through the use of detailed action plans where participants set a realistic goal to be met between class sessions. Significant improvements in social activity/role limitations were observed for participants in CDSMP and TCDS, with CDSMP participants reporting a larger magnitude of change. This difference between the magnitudes of program outcomes might be explained by the fact that the baseline value for social/role activity limitations was worse for CDSMP participants than those in TCDS.

Due to the fact that exercise has been proven to positively impact both physical and mental health, the CDC recommends that older adults engage in moderate-intensity aerobic activity for at least 2.5 hours each week and participate in stretching/strengthening activities at least two days per week (Centers for Disease Control and Prevention, 2011a). Older adults who exercise regularly report greater mobility (Chou, Hwang, & Wu, 2012; Freiberger, Haberle, Spirduso, & Rixt Zijlstra, 2012; Moore-Harrison, Johnson, Quinn, & Cress, 2009), better health status measures (Ackermann et al., 2003) and decreased health care costs (Ackermann et al., 2008). Exercise has also been shown to increase brain function (Kamijo, Nishihira, Higashiura, & Kuroiwa, 2007; McAuley, Kramer, & Colcombe, 2004; Colcombe & Kramer, 2003) and decrease depression (Herring, Puetz, O'Connor, & Dishman, 2012). Both CDSMP and TCDS encourage participants to engage in aerobic and stretching/strengthening activities, starting in small increments and at a pace that they feel comfortable with. Sustained health behavior change associated with increased self-management will continue to positively impact overall health and reduce utilization of health care services (Wagner et al., 2001; Clark et al., 2000). Regular exercise is a critical component of a successful, chronic disease self-management program. Improvements in time spent performing stretching/strengthening activities and aerobic activities were reported for both CDSMP and TCDS participants. The magnitude of change was greater for participants in TCDS; however, their baseline values were lower than participants in CDSMP allowing for the chance of greater improvement.

Future research on outcomes of CDSMP and TCDS should examine long-term maintenance using values obtained at the end of six weeks' instruction as a baseline. Past studies have evaluated outcomes at four, six, 12, and 24 months, but with baseline values being those prior to receiving any instruction. Findings may show that certain outcomes will continue to improve for a certain period of time following the end of class instruction and identify certain outcome improvements that may decrease at a faster rate than others. Research could also identify at which point a booster program to reinforce what was first taught would be most beneficial.

The effectiveness of self-management programs is only one aspect of combating chronic disease. The other is keeping participants enrolled in the class so as not to waste limited resources, such as time and money. Studies have documented the fact that certain demographic and psychosocial factors can predict the likelihood that an enrolled participant will meet the completion requirements of a health education intervention (Merrill et al., 2010; Radler & Ryff, 2010; Obasanjo & Kumwenda, 2009; Winslow et al., 2009; Jancey et al., 2007; Honas et al., 2003; Vanable et al., 2002; Frack et al., 1997). The identification of correlates of completion for the programs will allow developers and implementation staff to increase the likelihood of participant retention. In turn, this will help the organization offering the program utilize resources more efficiently and make the largest impact possible in the target population.

For this study, and other evaluations of CDSMP and TCDS, program completers were defined as attending at least four of the six sessions offered (Lorig, 2011; Evaluation Center Texas A & M, 2008). Future research could improve upon this definition by statistically supporting the minimum number of classes required to result in significant outcome improvements. Also, future research could evaluate which four of the six sessions might have the greatest impact on outcomes. Even though many of the demographic, health status, and psychosocial factors considered for this study were not found to be statistically significant correlates of completion, findings provide opportunities for future research to explore if these or other factors do or do not play a role in program completion, and to what degree, during the six weeks of instruction. Longer term research studies could also identify any factors that may influence the maintenance of improvements in self-efficacy, health behaviors, and social/role limitations that could then be incorporated into program development and content delivery strategies. Knowledge of the factors that may influence program completion can help program developers and implementation staff to incorporate targeted retention strategies to reduce attrition and increase the dose of the intervention.

This investigation adds support to the growing base of evidence that CDSMP and TCDS are effective in improving self-efficacy of disease self-management, improving health behaviors, and decreasing activity limitations. As both of these programs are successful in improving overall health and reducing health care costs, they should be considered for large-scale implementation. Currently, CDSMP and TCDS are being offered in many locations across the United States with funding through both private and government channels (local, state, and federal). The National Council on Aging (NCOA), with the support of the American Recovery and Reinvestment Act, is currently leading an initiative to deliver CDSMP to 50,000 people in 45 states, as well as Puerto Rico (National Council on Aging, 2010). In addition to onsite programs, the NCOA is managing trials, in seven states, to evaluate the effectiveness of CDSMP when delivered online, known as Better Choices, Better Health® (National Council on Aging & Stanford University, 2011). This move to reach as many older adults through both traditional and emerging avenues shows a great commitment to addressing the problem of chronic disease. With limited health care resources, proper self-management will help alleviate some of the burden related to chronic disease care and treatment by delaying disease progression. As the population of older adults grows, chronic disease self-management education will increase in importance and play an essential role in maintaining quality of life.

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APPENDIX

Table A.1 Questions and response scales found on baseline and six-week surveys

Measures Only at Baseline		
Concept Measured	Question	Metric/Response Scale
Health Status	In general, would you say your health is:	Single Item Scale: Poor Fair Good Very Good Excellent
	Now thinking about your physical health, which includes physical illness and injury, for how many days during the past 30 days was your physical health not good?	Open response
	Now thinking about your mental health, which includes stress, depression and problems with emotions, for how many days during the past 30 days was your mental health not good?	
	During the past 30 days, for how many days did poor physical or mental health keep you from doing your usual activities, such as self-care, work, or recreation?	
	We are interested in learning whether or not you are affected by fatigue or tiredness. To show how much fatigue or tiredness you felt in the past two weeks please put a circle around the number on the picture to the right that best describes your fatigue in the past 2 weeks.	Visual-analog scale from 0 (None) to 10 (Severe)
	We are interested in learning whether or not you are affected by shortness of breath. To show how much shortness of breath you felt in the past two weeks please put a circle around the number on the picture to the right that best describes your shortness of breath in the past 2 weeks.	
	We are interested in learning whether or not you are affected by pain. To show how much pain you felt in the past two weeks please put a circle around the number on the picture to the right that best describes your level of pain in the past 2 weeks.	

	We are interested in learning about the level of your frustration with your health problems. To show how much frustration you have felt in the past two weeks please put a circle around the number on the picture to the right that best describes your level of frustration in the past 2 weeks.	
Health care utilization	In the past 6 months, how many times did you visit a doctor?	Open Response
	In the past 6 months, how many times did you go to a hospital emergency department?	
	In the past 6 months, how many times were you hospitalized for one night or longer?	
	How many total nights did you spend in the hospital in the past 6 months?	
Communication with physician (three items)	When you visit your doctor, how often do you do the following:	Likert Scale 0 = Never 1 = Almost Never 2 = Sometimes 3 = Fairly Often 4 = Very Often 5 = Always
	Prepare a list of questions for your doctor?	
	Ask questions about the things you want to know and things you don't understand about your treatment?	
	Discuss any personal problems that may be related to your illness?	
Outcomes, measured at baseline and six weeks		
Concept Measured	Question	Metric/Response Scale
Self-efficacy to manage disease (three items)	How confident are you that you can control symptoms or health problems so they don't interfere with things you want to do most?	Cantril Ladder with anchors of 1 (Not at all Confident) to 10 (Totally Confident)
	How confident are you that you can keep physical pain or discomfort from interfering with the things you want to do most?	
	How confident are you that you can keep fatigue from interfering with the things you want to do most?	
Self-efficacy to mange emotions	How confident are you that you can use exercise to manage emotional ups and downs (to deal with fear, anxiety, depression, or frustration)?	
Self-efficacy to communicate with physician	How confident are you that you can communicate clearly and effectively with your doctor about your health care needs?	
Self-efficacy to use techniques covered in class	How confident are you that you can use techniques such as relaxation exercises, meditation, and visualization to help you deal with symptoms or health problems?	

Time engaging in aerobic activity (two items)	During the past week, even if it was not a typical week for you, how much total time (for the entire week) did you spend on each of the following:	Likert Scale 0 = None 1 = Less than 30 min/wk 2 = 30 - 60 min/wk 3 = 1 - 3 hrs/wk 4 = More than 3 hrs/wk
	Walking for exercise?	
	Any aerobic exercise (includes swimming, water exercise, biking, using aerobic exercise equipment, etc.)?	
Time engaging in stretching/strengthening activities	Stretching or strengthening exercises (range of motion, using weights, etc.)?	
Social/Role Activity Limitations (four items)	Has your health interfered with your normal social activities with family, friends, neighbors, or groups?	Likert Scale 0 = Almost Totally 1 = Quite a bit 2 = Moderately 3 = Slightly 4 = Not at all
	Has your health interfered with your hobbies or recreational activities?	
	Has your health interfered with your household chores?	
	Has your health interfered with your errands and shopping?	

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PUBLICATIONS AND PRESENTATIONS

Batra, A., Melchior, M., Seff, L., Newman, F., Palmer, R. (2012). Evaluation of a Community-Based Falls Prevention Program in South Florida. *Preventing Chronic Disease*.

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