August 2019

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Recommended Citation

Williams, Michelle Yvonne, "Medication Self-Management Behaviors of Community-dwelling Adults with Chronic Disease" (2019). *Theses and Dissertations*. 2268.
https://dc.uwm.edu/etd/2268

MEDICATION SELF-MANAGEMENT BEHAVIORS OF COMMUNITY-DWELLING ADULTS WITH CHRONIC DISEASE

by

Michelle Y. Williams

A Dissertation Submitted in
Partial Fulfillment of the
Requirements for the Degree of

Doctor of Philosophy
in Nursing

at
The University of Wisconsin-Milwaukee
August 2019

ABSTRACT

MEDICATION SELF-MANAGEMENT BEHAVIORS OF COMMUNITY- DWELLING ADULTS WITH CHRONIC DISEASE

by

Michelle Y. Williams

The University of Wisconsin-Milwaukee, 2019
Under the Supervision of Professor Rachel Schiffman, PhD, RN, FAAN

Chronic conditions threaten public health, individuals, and families and affect all areas of a person's life and require significant self-management from the individual with the disease, care from the healthcare provider and team, and support from the individual's family. The relationship of selected risk and protective factors and communication with healthcare providers to medication self-management behaviors and quality of life was examined in 616 adults with chronic disease in this secondary analysis of the Stanford University Chronic Disease Self-Management Program. Data were collected at baseline and at 6 and 12 months after enrollment. On average, the sample was 68 years of age, female, with 2 chronic diseases. About 95% reported being of non-Hispanic ethnicity. Less than 20% were Black/African American and more than 95% had healthcare insurance. Depressive symptoms were found to be significantly correlated with medication self-management behaviors and quality of life at baseline, 6 and 12 months after enrollment. In contrast, stress was only found to be significantly correlated with medication self-management behaviors at 12 months and with quality of life at baseline and 12 months after enrollment. Conversely, communication with physicians was not found to be associated with medication self-management behaviors or with quality of life at any time point. Depressive symptoms were the strongest predictors of both medication self-management behaviors and quality of life at all measurement points. Together, these findings suggest that community-dwelling adults with chronic disease who experience depressive symptoms and stress were more likely to report less medication self-management behaviors and poorer quality of life. There are implications for further research on communication with physicians to understand the relative value on patient outcomes. The implications for practice include potential application of the Individual and Family Self-Management Theory and aspects of the Stanford University Chronic Disease Self-Management model to care nursing practice.

Keywords: medication, self-management, chronic disease, stress, depressive symptoms, quality of life

To

my parents and my grandmother,

my husband,

my daughter, son-in-law, and grandchildren,

and especially my sons

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LIST OF ABBREVIATIONS

AHEAD	Asset and Health Dynamics Among the Oldest Old
ALL	Adult Literacy and Lifestyle
ANOVA	Analysis of Variance
AOR	adjusted odds ratio
ARMS-D	Adherence for Refills and Medications Scale for Diabetes
ASP	Academic Search Primer
CDC	Centers for Disease Control and Prevention
CDSMP	Chronic Disease Self-Management Program
CHF	congestive heart failure
CI	confidence interval
CMS	Centers for Medicare and Medicaid Services
DSMP	diabetes self-management program
ERIC	Education Resources Information Center
HRS	Health and Retirement Survey
IFSMT	individual and family self-management theory
MAR	missing at random
MCAR	missing completely at random
MMAS:4	Morisky Medication Adherence Scale:4-Item
MSMB	medication self-management behaviors
OR	odds ratio
PHQ	Patient Health Questionnaire
PSS	Perceived Stress Scale
RCTs	randomized controlled trials
REALM	Rapid Estimate of Adult Literacy in Medicine
SCD	sickle cell disease

SCT	social cognitive theory of self-regulation
SDSCA	Summary of Diabetes Self-Care Activities
SM	self-management
SSA	Social Sciences Abstract
SSI	supplemental security income
TAPS	Tool for Assessing Patient’s Stressors
VA	Veterans Affairs
VAS	Visual Analogue Scale
VNSQOL	Visual Numeric Quality of Life
VNSSTRS	Visual Numeric Stress Scale
WHO	World Health Organization
WOS	Web of Science

ACKNOWLEDGMENTS

Most importantly, I want to thank my major professor, Rachel Schiffman, Ph.D., R.N., F.A.A.N., for recognizing my potential to make meaningful contributions to the profession of nursing. Dr. Rachel Schiffman has challenged me continuously to tap into my leadership experience, strong knowledge base and capabilities to impart them through my scholarship. I appreciate her depth of knowledge of my research topic and the guidance and encouragement she provided as I shifted my topic into a broader area. Her expertise and scholarship in my area of study, plus her dedication to academic and translational research was most assuredly an asset in my development as a research scholar and nurse scientist. I thank Dr. Marilyn P. Chow for mentoring me and exemplifying nursing excellence, vision, and leadership, which always inspired me to be my best. Thanks to Dr. Larry R. Kidd, a nursing colleague and dear friend whose work, passion for and excellence in leading and development leaders, and encouragement reinforced that my goal to complete my Ph.D. was indeed doable. I thank my husband, Mr. Michael C. Williams, for his faithful dedication to me, our family, and my dream to pursue and complete my doctor of philosophy degree in nursing. Thanks to Dr. Katherine Sawin for her support with my theoretical framework, and for her role, along with Dr. Polly Ryan in developing the Individual and Family Self-Management Theory, which framed my doctoral research. I will forever be grateful for their pioneering work in an area of scholarship that I will most definitely use in my nursing practice and in future research.

I want to thank Dr. Fay Bower, for her critical feedback regarding my scholarship potential and professional career. In fact, it was Dr. Bower who challenged me to look beyond my career to visualize myself accomplishing my masters of nursing and doctor of philosophy degrees—and, leveraging my broadened knowledge base to contribute to the profession of nursing more profoundly. To Mr. Lucas Soltero, an 11 year (seven years active and 4 years in the reserves) Navy Air Traffic Controller, who went into the service after high school, I am forever in your debt for the heaving lifting you did to resize my correlation matrix analysis for my dissertation. Lucas was patient and very kind as I took up a great deal of his time frantically desiring to fit too much data onto one 8x11 page. Thank you, Lucas, for making it work!

I thank my mother, Mrs. Charlene Barrett, for everything, and for telling me as a young girl that I could do anything. Thanks, mom, I believed you. To my siblings, Deborah, Marlene, Michael, Donald and Eddie, I love you all very much and thank you for your love and support. To the memory of my dad, Mr. Eddie Ford Barrett, I am eternally grateful for the moments of inspiration I saw in you, including the day you made a pottery wheel for me and the Saturday you allowed me to accompany you to Bank of America in Oakland, CA. Both experiences inspired me to be spontaneous and think outside the box! To my most beloved grandmother, Mrs. Mary Fraser-Williams, you were simply marvelous. You taught me to be an honest, decent person. I think about you every day and thank God for your life. Aunt Bobby-Jean, R.N., M.S.N., I will never forget the influence you had on me when you waltzed into our home after living abroad for about a decade—practicing as a registered nurse in an exotic county. It was at that moment that I knew I wanted to become a registered nurse. You and my mom helped me define who I would be as a nurse—fearless and unashamed of being one of very few woman of color at the levels of nursing I dreamed…knew I'd rise to. Thank you both for taking that road before me.

I dedicate this work to my children, Mrs. Tiffany McClain, Mr. Murphy and Mr. Michael Williams, and my son-in-law, Pastor Jeremy McClain, and grandchildren, Ms. Savannah, Mr. Silas, and Mr. Caleb McClain, and most especially to my husband, Mr. Michael Cleophas "MC"

Williams, and to the legacy his parents, Dr. Murphy C. Williams and Mrs. Anna Lee Williams have left behind in our family! And, to my husband's sister and her family, the Russell's, Mr. Clifford Russell, Mrs. Pepper Russell, and, their children, Mr. Nile, Mr. Khalil, and Ms. Cayenne Russell; and Mr. Terrell and Mrs. Ashley Williams and their three beautiful sons.

EPIGRAPH

Drugs don’t work in patients who don’t take them.

─Koop, C. Everett

13th Surgeon General, United States of America

CHAPTER 1

STATEMENT OF THE PROBLEM

Goodman, Posner, Huang, Parekh and Koh (2013) asserted that United States (US) trends in age dispersion, population increase, and disease suggest rises in the incidence of chronic disease. These trends threaten public health and the financial stability of the US. The number of Americans with one or more chronic health condition was 125 million in 2000. The number of Americans with one or more chronic health condition grew to 133 million by 2002, and, by 2020, experts expect that 157 million people in the US will have at least one chronic health condition (Comlossy & Walden, 2013). Over the past 50 years, as chronic health conditions have become more prevalent and treatment regimens more reliant on pharmacologic therapies, research on medication self-management has proliferated (DiMatteo, 2004b). Medications are key to the treatment of many chronic health conditions but taking them as prescribed is a complex task with which many patients have difficulty (Marek, Stetzer, Ryan, et al., 2013). Individuals are often challenged to follow complex treatment recommendations as directed resulting in increased morbidity and mortality.

Purpose of the Study

The purpose of the study was to apply Ryan and Sawin's (2013) Individual and Family Self-Management Theory (IFSMT) to gain additional understanding of participants in the Chronic Disease Self-Management Program (CDSMP) national study (Ory, Anh, Jiang, Lorig, Ritter, Laurent, Whitelaw, & Smith, 2013) and the associations among selected variables, medication self-management behaviors, and subsequent quality of life. The findings may have benefit to structure nursing practice and patient care around the use of medication self-management approaches across healthcare settings.

Research Questions

1. What context variables (individual/family perception of condition, health care access, culture, individual factors, developmental stages, learning ability, literacy, family structure and functioning, and capacity to self-manage) are associated with the proximal outcome of use of medication self-management behaviors (MSMB) at baseline, and at 6 months and 12 months after the CDSMP intervention?
2. What context variables (individual/family perception of condition, health care access, culture, individual factors, developmental stages, learning ability, literacy, family structure and functioning, and capacity to self-manage) are associated with the distal outcome of quality of life at baseline, and at 6 months and 12 months after the CDSMP intervention?
3. Is the process variable of communication with physicians (social facilitation) associated with the proximal outcome of medication self- management behaviors at baseline, and at 6 months and 12 months after the CDSMP intervention?
4. Is the process variable of communication with physicians (social facilitation) associated with the distal outcome of quality of life at baseline, and at 6 months and 12 months after the CDSMP intervention?
5. What combination of baseline, 6- month, 12- month context and process variables best predict medication self-management behaviors and quality of life?

Background and Significance

During the late 1960s and early 1970s, research on the use of medication, more specifically, adherence by patients to the medication prescribed to them by doctors, have reached prominence as part of the broader concept of chronic disease self-management for two reasons. First, state and federal health care agencies recognize the growing prevalence of chronic health conditions that span more than 120 million American adults, translating to a hefty 80–95% of the total U.S. health care costs (Centers for Disease Control and Prevention [CDC], 2011; DiMatteo, 2004b; Thoesen Colman & Newton, 2005). Second, an estimated 40–60% of people do not take their medication as prescribed, which leads to worsened health outcomes and higher health care resource utilization (Mahtani, Heneghan, Glasziou & Perera, 2011). A reported 30% of patients took prescription medications less often than were prescribed, 26% delayed filling a prescription, 21% stopped taking a prescription sooner than prescribed, 18% never filled a prescription, and 14% took smaller doses than prescribed (Flanagan, Gartenmann, Lovich, Lubkeman, & Roselund, 2003). Research has shown that over a one-year period only 50–60% of patients are taking medications as prescribed over a 1-year period (Haynes, Yao, Degani, et al., 2005; Kripalani, Henderson, Chiu, et al., 2006; Osterberg & Blaschke, 2005; Vermeire, Hernshaw, Van Royen, & Denekens, 2001). Holman and Lorig (2004) postulated that self-management (SM) is a common concept “in health care education and is the name attached to many health promotion and patient education programs” (p. 1). Further, Holman and Lorig (2004) asserted the term *self-management* was first used by Creer in the mid-1960s in a book on the rehabilitation of chronically ill children, and further used by Creer and colleagues at The Children’s Asthma Research Institute and Hospital in its pediatric asthma program. Holman and Lorig (2004) submitted that self-management is a salient concept for behavioral interventions and a mechanism to improve health-related skills and behaviors. Furthermore, Holman and Lorig

2003) suggested that, whether engaging in a health activity such as exercise or simply living with a chronic disease such as hypertension, individuals are responsible for the day-to-day management of their chronic illnesses including their medication regimen. These assertions by Holman and Lorig (2004) reflect origins of the development of the self-management concept and practice in health care and its relative link to health behavior change, which has continued to be a central focus of chronic disease management translational research.

Theoretical Framework

A proposition of the Individual and Family Self-Management Theory (IFSMT) is that successful management of chronic conditions and active engagement in healthy lifestyles is increasingly perceived as the responsibility of the individual, with support provided by his or her family.

IFSMT conceptualizes self-management as

> [a] process in which individuals and families use knowledge and beliefs, self-regulation skills and abilities, and social facilitation to achieve health-related outcomes. Self-management takes place in the context of risk and protective factors specific to a health condition, physical and social environment, and individual and family. Self-management is applicable to chronic conditions as well as health promotion. ("Self-Management," n.d., para. 1)

Ryan and Sawin (2009) posited that self-management has traditionally centered on individuals or families, whereas IFSMT reflects the integration of individual and family self-management into one theory. The authors acknowledged the systemic nature of the individual and family dynamic—in particular, the effect of one component of the system (family) on the larger system and each of its unique members.

IFSMT is a mid-range nursing theory that comprises three dimensions: context, process, and outcomes (Ryan & Sawin, 2009). The context dimension consists of condition-specific risk and protective factors, including disease and treatment complexity, physical and social environment, including access to care, culture, and social capital, and individual and family factors, including literacy, developmental stages, and information processing. The process dimension includes "knowledge and beliefs, self-regulation skills and abilities, and social facilitation" (Ryan & Sawin, 2009, p. 225). By enhancing the process of SM, the proximal and distal outcomes associated with use of pharmacological therapies and quality of life can improve for individuals with chronic health conditions and their families.

There are two outcomes dimensions: proximal or short-term outcomes, and distal or long-term outcomes. As Ryan and Sawin (2009) explained, proximal outcomes involve actual engagement in SM behaviors that are specific to health condition, risk, or transitory occurrence, in addition to symptom management and the use of medicines. Successful achievement of proximal outcomes can have a positive effect on distal outcomes. Distal outcomes are structured into three categories, including cost of health, quality of life, and status of health.

In application to the current study, the IFSMT is used to organize the participant's risk and protective factors (within the context dimension), self-management activities (within the process dimension), and outcomes (under the proximal and distal outcome dimensions). The risk factors included in the context dimension are the individual's chronic health disease burden (the number of chronic conditions, e.g., having hypertension, diabetes, asthma, which would equal three chronic health conditions), lack of health care access (e.g., no health care insurance, literacy, inability to participate in medical appointments, inability to offset prescription medication costs, etc.), race/ethnicity (i.e., Black/African American, Hispanic, other minority races), level of stress, and depressive symptoms. Self-management activities, such as social facilitation (e.g., social support and negotiated collaboration among individuals and health care professionals) are arranged under the IFSMT SM process dimension and are indicative of an individual's use of SM activities to conduct self-management behaviors.

From the perspective of the IFSMT, individual and family SM involves the intentional inclusion of health-related behaviors into an individual or family's day-to-day activities (Ryan & Sawin, 2009). As the individual and family assume responsibility for individual and family SM, they are also likely to work in collaboration with their health care provider and team (Ryan & Sawin, 2009). Individual and family sharing of SM responsibilities results in improved health outcomes, better quality of life, and commitment to improving their medication self-management behaviors (Marek et al., 2013).

Understanding the role that risk and protective factors and the self-management process plays in medication self-management behaviors and quality of life among adults with chronic health conditions is shifting from medication adherence (compliance) to more of a partnership between the providers, patients, health care team, and the patient's family. Moreover, having knowledge of factors related to MSMB and QOL and the relationship they have to chronic health condition related outcomes will enable nurses and other clinicians across the health care continuum to better support individuals and their families.

Medication Self-management Behaviors

Adherence, compliance, concordance, patient education, and self-care are commonly used constructs in the medication self-management theoretical and research literature relating to medication self-management behaviors and lifestyle changes in chronic disease. Ryan and Sawin (2009) asserted SM integrates individual and family SM, combining their collective perspectives, role distinctions and changes over time, and control and responsibility for managing individuals' chronic health conditions and intentional involvement in health promotion and wellness activities. Adherence, compliance, and concordance are part of SM. Most chronic diseases do require some scheduled and prn medication to manage (insulin, antihypertensive agents, and inhalers) but taking one's medication as prescribed is one action within a large arena of actions that individuals and their families use to self-manage. because each imparts the patient's responsibility in accepting and carrying out expectations given to the patient by the provider, which, unlike SM, does not acknowledge individual and family autonomy, control, and responsibility for SM. Ryan and Sawin (2009) also purported self-care and patient education fall short of the overall objective because neither concept interprets SM in the context of the individual and family; rather, self- care refers to performance activities, such as daily hygiene (e.g., toileting, bathing) and engagement in layman's health behaviors. In alignment with IFSMT, individuals with chronic health conditions and their families hold complete responsibility and control over medication self-management, which is the primary tool "used to prevent and effectively manage chronic illness" (Bosworth, Granger, Mendys, et al., 2011, p. 412).

Use of recommended pharmacological therapies is conceptualized in the current study as medication self-management behaviors, medication adherence, and medication compliance. Medication self-management is operationalized in the CDSMP questionnaire using the MMAS-4 to elicit participant responses regarding MSMB. Definitions presented in this chapter describe the use of these concepts and their relative operationalization. Although adherence continues to be the focus of most of the studies on chronic disease, a shift to MSMB is apparent in some of the recent literature, which might result in future research yielding evidence to expand our SM understanding and knowledge base. The historical concentration on adherence has resulted in a gap in progressively validated SM behaviors and outcomes related to improving medication self-management behaviors.

In Ryan and Sawin's (2014) revised model of the IFSMT, shown in Figure 1, the context and process dimensions are presented in a columnar, categorical format with underpinning concepts. Outcomes are measured in two ways: proximally and distally. Proximal outcomes fall into two broad categories of behaviors and health care service-related costs, while distal outcomes are aligned under health status, quality of life, and direct and indirect cost of health.

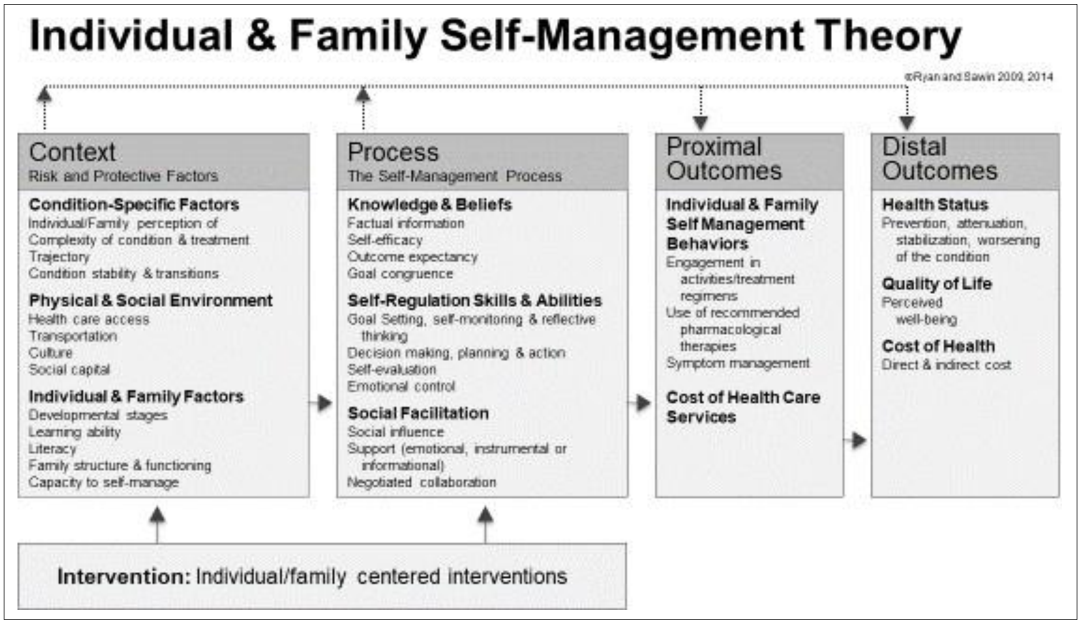

Figure 1. The Individual and Family Self-Management Theory theoretical model. Adapted from "The Individual and Family Self-Management Theory (IFSMT) [Revised figure]," by P. A. Ryan & K. J. Sawin, 2014. Copyright 2014 by Ryan and Sawin. Adapted with permission.

IFSMT Theoretical and Conceptual Framework

In the dimension of context; risk and protective factors, the specific topical areas and concepts are as follows:

- condition-specific factors: individual/family perception of condition;
- physical and social factors: health care access and culture; and
- individual and family factors: developmental status, learning ability, literacy, family structure and functioning, and capacity to self-manage.

Determinants of health, which include concepts, such as, social factors, health services, and biology and genetics could be a risk or protective factor for individuals and families, depending on several factors. Biological and genetic factors put participants in the current study at greater risk for poor outcomes, including the number of chronic health conditions they have, their gender, and age. Social factors, such as one's race and ethnicity, puts individuals and families at significant risk for health disparities. According to the Centers for Disease Control and Prevention (CDC), 2011, socially disadvantaged groups (Blacks, Hispanics, etc.) experience preventable differences in the burden of disease. Health services, such as lack of health insurance, limits an individual's ability to access needed healthcare, including the inability to pay for a physician office visit, prescription medication, and hospitalization.

In the dimension of process; the self-management process, the specific topical area and concept are as follows:

- social-facilitation: social influence, support, and negotiated collaboration between individuals and families and health care professionals.

The Theory of Social-Facilitation defined by McLeod (2018) as an individual's positive performance improvement that is produced by being in the presence of others is also germane in this context. According to Cottrell (1972), "it's not the presence of other people that is important to social facilitation to occur but the apprehension about being evaluated by them" (p. 245). Claypoole and Szalma (2017) indicated, "Cottrell argued that an evaluative context rather than a mere social presence of another person is necessary for the strengthening of dominant responses that affect performance" (p. 2). According to Ryan and Sawin (2009), individuals who experience positive social facilitation that influences and supports them, are more likely to engage in recommended health behaviors.

In a meta-analysis on support from providers among patients with chronic health conditions, DiMatteo (2004a) found that provider support had a positive effect on medication self-management behaviors. Further, functional support, which DiMatteo defined as practical, instrumental and emotional support, and family cohesion, had stronger effects on medication self-management behaviors compared to other forms of social support.

In the dimension of proximal outcomes; individual and family self-management behaviors, the concept is as follows:

- use of recommended pharmacological therapies.

In the dimension of distal outcomes; quality of life, the concept is as follows:

- quality of life/perceived well-being.

Lifetime management of chronic health conditions require healthcare providers, patients, and families to partner in managing routine treatments, symptoms, and behavioral and lifestyle modifications. When patients (and their families) self-manage the complexity of their chronic health conditions, particularly multimorbidity, symptoms, treatments, multiple providers, and restructure risky lifestyle behaviors, the result is better quality of life and health outcomes (Gazmararian, Kripalani, and Miller et al., 2006; Pearson, Mattke, Shaw, Ridgely & Wiseman, 2007).

Conceptual Framework

In the current study, the IFSMT was used to set the conceptual framework. Specifically, the concepts in the current study were aligned within the IFSMT columnar, categorical structure under the appropriate theoretical dimensions. Concepts reflecting individual and family risks and protective factors were listed under the IFSMT context dimension, while concepts denoting the self-management process were listed under the process dimension, and outcomes concepts were aligned under the IFSMT outcomes dimension in either the proximal or distal outcomes column. The application of the

IFMST as the conceptual framework for the current study is reflected in Figure 2.

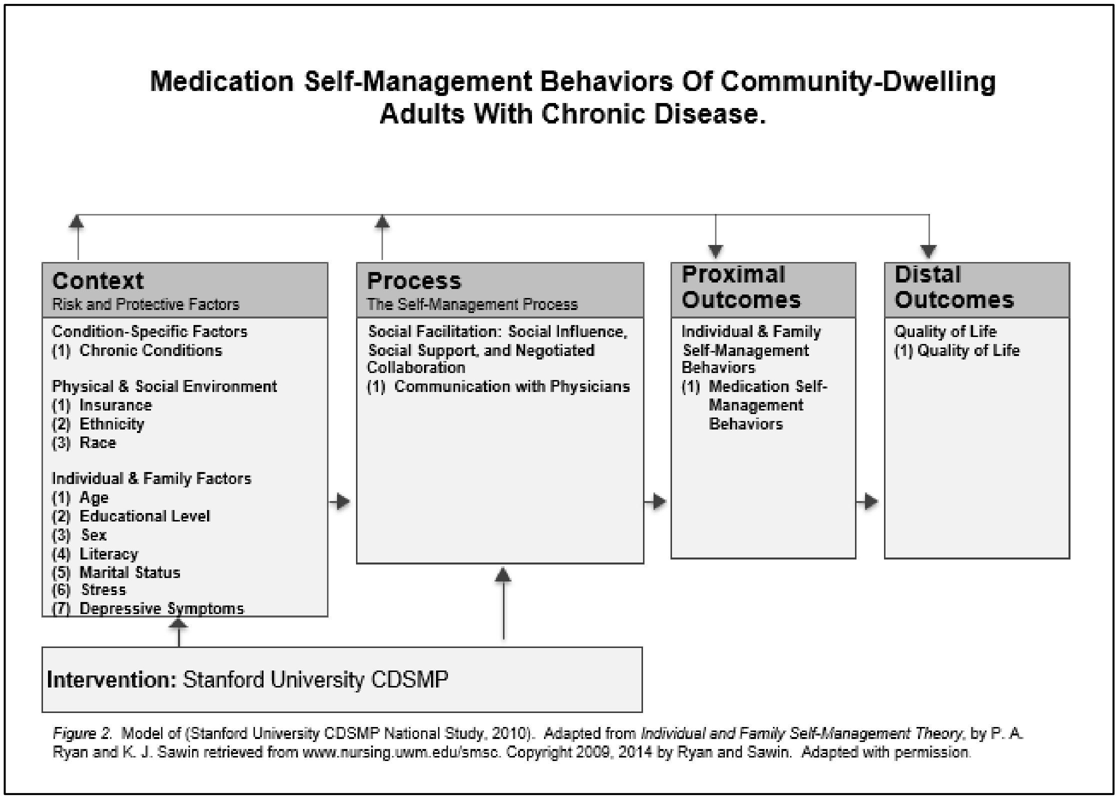

Figure 2. Model of Stanford University CDSMP National Study: Secondary analysis IFSMT model. Adapted from “The Individual and Family Self-Management Theory (IFSMT),” by P. A. Ryan & K. J. Sawin, 2009, 2014. Copyright 2009, 2014 by P. A. Ryan and K. J. Sawin. Adapted with permission.

Context Dimension: Risk and Protective Factors

Condition-specific factors. IFSMT defined *condition-specific factors* as “factors that challenge or protect individual’s and family’s engagement” in the self-management (SM) process, such as characteristics of the condition, including treatment requirements, or preventive measures impacting the frequency and type of behaviors needed for successful SM (Ryan & Sawin, 2009, p. 225). Individual and family perception of condition-specific factors are condition-specific factors in which the individual self-reports having chronic health conditions (Ryan & Sawin, 2009).

Physical and social environment factors. IFSMT defined *physical and social environment factors* as “factors in the context dimension that affect an individual’s and family’s ability to engage in the process dimension and have direct impact on outcomes" (Ryan & Sawin, 2009, p. 224). Health care access and culture are situated under the IFSMT physical and social environment factors in the context of dimension and are defined below. Health care access is in the IFSMT physical and social environment category, which includes factors such as physical and social, transportation, work, and school and social capital, among others. The lack of health insurance puts individuals and families at greater health risk as it limits their ability to access needed healthcare, including the inability to pay for a physician office visit, prescription medication, and hospitalization; thereby, impeding the individual and family's ability to successfully manage their health, and subjecting them to poor health outcomes.

Culture is in the IFSMT physical and social environment category, which includes factors such as health care access, transportation, work, and school and social capital, among others. According to the CDC (2013), socially disadvantaged groups (Blacks, Hispanics, etc.) experience preventable differences in the burden of disease.

Individual and family factors. IFSMT suggests that individual and family factors place individuals at greater risk for poor health and poor outcomes due to cognitive challenges, complex health regiments, and other vulnerabilities (Ryan & Sawin, 2009). Developmental stages, learning ability, literacy, and family structure are situated under the IFSMT individual and family factors in the context dimension.

Developmental stage is in the IFSMT individual and family factors category. Erikson's (1959) psychological development theory has eight distinct stages, which correlate with chronologic age and psychological crisis (e.g., 3–5 years of age, 18–40 years of age, and 65+ years of age, and autonomy versus guilt, identity versus role confusion, and generativity versus stagnation). According to McLeod (2018),

> During each stage, the person experiences a psychosocial crisis which could have a

> positive or negative outcome for personality development. For Erikson (1963), these crises are of a psychosocial nature because they involve psychological needs of the individual (i.e., psycho) conflicting with the needs of society (i.e., social). (para. 3)

Learning ability is in the IFSMT individual and family factors category, which includes other factors such as those above and capacity to self-manage. Freedman and Aykan's (2003) findings were consistent with previous studies; in particular, a participant's chronologic age (51–61 years of age) and increased educational attainment/level were important factors in successful medication self-management.

Literacy is in the IFSMT individual and family factors category. Kripalani, Henderson, Jacobson and Vaccarino (2008) posited, "Limited literacy is a very common problem in the United States, affecting more than 90 million adult Americans" (p. 118). These authors suggested that literacy is associated with an individual's ability to understand drug use indications and potential side effects. Those with low literacy skills are more likely to experience difficulty identifying their own prescribed medications and distinguishing one drug from another (Kripalani et al., 2008), which makes low literacy a health risk factor.

Family structure is in the IFSMT individual and family factors category. The individuals and family factors are related to the actual characteristics of the individual with the chronic health condition and their family (Ryan, & Sawin, 2009).

Capacity to self-manage is in the IFSMT individual and family factors category. Individuals, along with their families feel pressure to sort through the mire of conflicting and confusing health care information to successfully engage in behaviors supporting their health (Ryan, & Sawin, 2009). Often, the efforts of individuals and families to self-manage their health is derailed by social, emotional, environmental and other factors that are incompatible with attempts to improve their health. Factors affecting self-management efforts of individuals and families may include, living in high crime neighborhoods that are unsafe for exercise, lack of available healthy food choices, untoward family and cultural traditions and expectations, and personal challenges with emotional, mental health, and drug or alcohol related symptoms (Ryan, & Sawin, 2009).

Kretchy, Owusu-Daaku and Danquah (2014) suggested, patients with hypertension experience countless emotions that put them at greater risk for developing mental illness, mainly depression and anxiety. Likewise, Osborn, Mayberry, Wagner and Welch (2014) postulated, racial/ethnic minorities and populations with low social-economic status are at greater risk than there non-Hispanic White counterparts to experience many chronic stressors, such as, unfair treatment and racial discrimination, substance abuse, money troubles, and familial stress. These social disadvantages are connected to exposure to more stressors, experiencing more depressive symptoms, and poorer health outcomes (Osborn et al., 2014).

Process Dimension: The Self-Management Process

The IFSMT process dimension includes concepts related to health behavior theories, practice, and research, including health behavior change theories, social support, self-regulation theories, and research evidence related to chronic disease self-management (Ryan, & Sawin, 2009). The categories in the IFSMT process dimension include knowledge and beliefs, self-regulation skills and abilities, and social facilitation. Social-facilitation aligns conceptually within the current study and is further defined below.

Social-facilitation: *social influence, support, and negotiated collaboration.* IFSMT defines social-facilitation in terms of how an individual experience it and whether their experience positively influences and supports them with engaging in health prevention behaviors (Ryan, & Sawin, 2009). Social influence, support, and negotiated collaboration are situated under the IFSMT social-facilitation category in the process dimension. Social-facilitation involves an individual's adoption of health- related behaviors because of support they experience from a social influencer, such as a provider.

Outcome Dimension: Proximal and Distal Outcomes

The IFSMT outcome dimension includes two categories, proximal outcomes, which include "engagement in SM behaviors specific to a condition, risk, or transition, in addition to managing symptoms, and pharmacological therapies," and distal outcomes that "are related, in part, to successful achievement of proximal outcomes," falling into three key categories: "health status, quality of life or perceived well-being, and cost of health—both direct and indirect" (Ryan & Sawin, 2009, p. 224). The two IFSMT proximal outcomes categories include (1) *Individual and Family Self-Management Behaviors,* and (2) *Cost of Health Care Services*. IFSMT defines individual and family self-management behaviors as "self-management behaviors specific to condition, risk, or transition, in addition to managing symptoms, and pharmacological therapies" (Ryan & Sawin, 2009, p. 223). Cost of health care services, which individuals and families and insurers are responsible for. These costs generally include physician office and emergency room visits, hospitalizations, treatments and pharmacological therapies, and costs associated with access to health care, such as transportation, equipment and insurance copays.

Proximal outcome: Use of pharmacological therapies is a concept under the IFSMT proximal outcome dimension situated under individual and family self-management behaviors. Distal outcome: Quality of life is a concept under the IFSMT distal outcomes, which is "related to successful achievement of proximal outcomes." (Ryan, & Sawin, 2009, p. 224). Proximal outcomes such as "engagement in activities/treatment regimens, symptom management, and use of recommended pharmacological therapies," when achieved, can cause individual and family SM distal outcomes, health status, quality of life, and cost of health, to improve or not improve (Ryan, & Sawin, 2009, p. 224).

Conceptual Definitions

Context Dimension Concepts

Chronic health condition. A chronic health condition is an endless, usually incurable condition that requires ongoing medical care and often long-term prescription medication, affecting an individual's daily life (Warnke, Nordt, Kawohl, Moock, & Rössler, 2016). According to Lorig, Holman, Sobel, Laurent, González, & Minor (2012), chronic health conditions, unlike acute health conditions (which are generally characterized by an individual cause, sudden onset, and short duration), develop over time, can be hereditary or environmentally caused, such as pulmonary disease or cancer, and usually do not have a cure but are lifelong. Sobel, Lorig and Hobbs (2002) reported that "chronic disease—the principal cause of disability and the major reason for seeking health care—accounts for over 70% of all health care expenditures" (p. 15).

Primary care physician practices are becoming overwhelmed by the growing number of aging Americans who compose the more than 75 million persons with two or more concurrent chronic health conditions (Grant, Ashburner, Hong, et al., 2011). Primary care providers indicated having a clearer understanding of the attributes that contribute to the complexity of their patients' health needs, which they described as multifaceted and not completely captured by the number or type of chronic diseases or health care costs alone (Grant et al., 2011).

Health insurance coverage. In the current study, insurance is defined as health insurance coverage that pays for the costs associated with the insurance holder's medical expenses. This includes the costs related to physician office visits, emergency room care, prescription medication, and hospitalization. Following enactment of the Patient Protection and Affordable Care Act (ACA) of 2010 and changes in health care insurance coverage (Hinds, Hatch, & Samuels, 2014), Sommers, Musco, Finegold, Gunja, Burke and McDowell (2014) found "an increase of 2.2 percentage points in the likelihood of having a personal doctor and a decrease of 2.7 percentage points in the proportion of adults unable to afford medical care" (p. 4). Likewise, Sommers, Gawande and Baicker (2017) posited health insurance coverage expansion through the Affordable Care Act was correlated with higher rates of individual access to health care, the ability to afford needed health care, and better health outcomes. Sommers et al. (2017) suggested the "effects of coverage are particularly important for people with chronic conditions" (p. 588). Significant increases in rate of diabetes diagnosis, diabetic medication use, and blood pressure control were seen as the effects of health insurance coverage expansion, according to Sommers et al. (2017). Ngo-Metzger, Sorkin, Billimek, et al. (2011) found that having health insurance may alleviate some financial burdens; however, many vulnerable populations (low-income and racial/ethnic minority patients) continue to face competing economic demands. The authors cited these competing economic demands as fundamentals such as paying the mortgage; to meet these demands, those with financial burdens often cut back on physician appointments and the use of their medications because of high out-of-pocket co-pays.

Heisler, Langa, Eby, et al. (2014) conducted a study that investigated the health effects of restricting medication use due to cost. Of the 7,991 participants in the study, Heisler et al. found 546 participants, who were more likely to be younger, women, Latino, Black, or Asian Americans, restricted their prescription medications due to cost. Further, Heisler et al. found that the participants who restricted their medications had lower educational levels, lower household incomes, and no insurance or poor prescription medication coverage.

Ethnicity and Race. Ethnic is defined as "of or relating to large groups of people classed according to common racial, national, tribal, religious, linguistic, or cultural origin or background" (Merriam-Webster.com, 2019). Ethnicity refers to a particular ethnic affiliation. In the current study, ethnicity is defined as of or relating to a Hispanic or Latino cultural origin or background. Merriam-Webster.com defined race as “a class or kind of people,” and, “a category of humankind that shares certain distinctive physical traits” (Merriam-Webster.com, 2019). In the current study, race is defined as kinds of people whom are categorized as White, Black, or Other.

According to Markus, 2008, “race is a dynamic set of historically derived and institutionalized ideas and practices that sorts people into ethic groups” based on perceptions of physical and behavioral human traits; whereas, “ethnicity is a dynamic set of historically derived and institutionalized ideas and practices that allows people to identify with groupings of people on the basis of presumed commonalities, including language, history, nation or region of origin, customs, ways of being, religion, names, physical appearance, and/or genealogy or ancestry” (p.654). Yet, Pan, Glynn, Mogun, Choodnovskiy, and Avorn (1999) suggested ethnicity and race are often used interchangeably. In fact, Pan et al. explained that ethnicity referred to a “shared cultural identity, whereas race implies inheritable biological and genotypic traits” (p.730). Furthermore, Pan et al. concluded “a person can be characterized by both race and ethnicity; for instance, there are both black and non-black Hispanics” (p.730).

Though categorizing people into ethnocultural groupings is difficult, an individual’s ethnic/racial background can provide important clinical information regarding health risks, medical diagnoses, and treatment. In the current study, both race and ethnicity were used to identify participants; as, in the original study, participants were asked for their race and ethnicity separately (Pan et al., 1999).

Age. In the current study, age is defined as the number of years an individual has existed in their life and as a proxy for developmental stage. In their study on aging, adult development, and work motivation, Kanfer and Ackerman (2004) “described how age-related changes and adult development may influence motivation” (p. 447). Moreover, Kanfer and Ackerman suggested that aging workers are less open to new experiences as compared to their younger counterparts. McLeod (2018) discussed Erik Erickson's Stages of Psychological Development, indicating that in the eighth phase, *Ego Integrity verses Despair,* those 65 years of age and older tend to slow down their employment productivity and begin to explore a quieter, retired life. With apparent alignment of age and developmental stage, particularly for people over 65 years of age, it is reasonable for age to serve as a proxy for developmental stage, in the current study.

Education level. In the current study, education level served as a proxy for learning ability and is reflected as years of education from 1-23 across the American primary, high school, college and graduate school continuum, with 1-6 indicating primary school and 17-23+ reflecting graduate school and beyond. In a heart failure study in which educational level and cognitive status were examined among individuals in a self-management program, results showed those with higher cognitive level benefitted more from the chronic disease self-management program (Smeulders et al, 2010). In a study that examined medication use and functioning among pre-retirement Americans, Freedman and Aykan (2003) found a link between increased medication use and increased educational attainment, which these authors defined as years of education completed. Alguwaihes and Shah (2009) found that years of education completed was associated with health care utilization and self-care behaviors in individuals with diabetes. In fact, Alguwaihes and Shah (2009) posited, those with more years of education completed made better health decisions and exhibited more effective health behaviors, such as making meal plans and abstaining from smoking.

Sex. In the current study, sex is defined as two sexes, male and female, and are biological variables. The National Institute of Health (NIH, 2017) has written specific policies on the inclusion of women in research, and, thereby, considers sex to be a biological variable, in which both sexes, male and female, are distinguished in regards to data collection, results analyses, and reporting of findings (NIH: NOT-OD-15-102, 2015). Distinguishing the biological variable, sex, as two sexes, male and female, may be critical in data interpretation, validation, and the generalizability of research findings. Furthermore, disaggregation of research data by sex allows for sex-based comparisons, which may inform clinical interventions. In addition, sufficient analysis and transparency in reporting data by sex may consequently enhance the precision and applicability of clinical research (NIH, 2015).

Chang, Chien, Lin, Wu, Chiu and Chiou (2016) found the progression of chronic kidney disease differed depending on sex. Chang et al. also posited men with diabetes are at higher risk for nephropathy than their female counterparts. Chang et al. (2016) found chronic kidney disease (CKD) differed depending on sex. Men showed substantially greater prevalence of CKD compared to women (Chang et al., 2016). In contrast, women were found to have a higher risk of diabetes disease progression than men (Chang et al., 2016). Gender, which refers to the expectations and roles attributed to women and men in society, is thought to be a social, and not a biologic construct (Phillips, 2005). Both sex and gender influences health, particularly for women, as, in some societies, women lack power and control, which causes women disproportionate barriers to basic and health resources (Phillips, 2005). Therefore, sex and gender are both risk and protective factors, which affects physical and social determinants of health.

Literacy. In a study examining medication self-management skill in a low-literacy population, Kripalani et al. (2006) found that patients with low literacy had lower medication management capacity than their more literate counterparts and they were more likely to exhibit ineffective medication self-management behaviors. Literacy was defined in the Adult Literacy and Lifestyle (ALL) Survey as the knowledge and skills needed to understand and use information from text and other written formats. Alternatively, the Rapid Estimate of Adult

Literacy in Medicine (REALM) literacy scale measures the number of words a person can read aloud and pronounce correctly, each within 5 seconds. Though not fully aligned with the ALL or REALM surveys, the literacy question in the current study was defined by the principal investigators as “the degree to which individuals have the capacity to obtain, process, and understand basic health-related decisions” (Chew, Griffin, Partin, Noorballochi, Grill, Snyder, Bradley, Nugent, Bains, & VanRyn, 2008, p.561). In their study, Chew et al. found that the literacy question used in the current study “performed significantly better for detecting patients with inadequate health literacy,” when using the REALM as the gold standard (p.564).

Married. In the current study, married is defined as having or not having a spouse. Aikens, Trivedi, Aron, & Piette (2014) studied the effects of integrating support persons into a chronic disease telemonitoring program to improve self-management among older adults. In Aikens et al.’s study, the support person was a spouse, other family member, or a close friend. As active care partners who were educated on the patient’s health conditions and needs, the researchers found the support persons were helpful in assisting the patients to self-manage their health care needs. Social support from family members, including spouses, parents and children, coupled with that from health care providers can help patients with improving their health status and self- management behaviors (Sperber, Sandelowski, & Voils, 2013). Generalized positive relationships are linked to better outcomes among individuals with chronic health conditions. Spouses who provide emotional support to their wives/husbands encourage them to initiate and sustain enough levels of physical activity, healthy cooking and eating, and assertiveness with their health care providers (Sperber et al., 2013). Likewise, if social support is lacking from spouses or other family members, the benefits are not realized, and the individual is at risk for poor health outcomes.

Stress. Stress has many definitions. Stress can be caused by both negative and positive events. Stress has been described as a nonspecific physiological response to any demand that is made upon the human body (Lorig, Holman, Sobel et al., 2017). Human beings are able to adapt to these stressful demands regardless of whether they are pleasant or unpleasant. Examples of events that engenders stress may include child birth, the death of a loved one, or even festive events such as celebratory parties. Lorig, Holman, Sobel et al. (2017) indicated that all types of stressors result in the same changes in the human body. Stressors can be physical, resulting in increased fatigue or worsened health conditions, or mental and emotional, which could exacerbate feelings of worry, frustration and lead to more severe forms of stress. Environmental stressors, such as bad weather, unpleasant noises, and social conditions, such as crime and poverty, can trigger stress and result in a stress response (Lorig, Holman, Sobel et al. (2017). Osborn, Mayberry, Wagner and Welch (2014) posited race, ethnicity, and low socioeconomic status are associated with the experience of chronic stressors, including racial discrimination, unjust treatment, substance-related problems, financial hardships, familial issues, and problems related to crime and living in unsafe neighborhoods. Lorig et al. (2014) found the five most common stressors were “sickness or disability in my family or myself, or death in the family (57.3%); not enough money for food, rent or mortgage, or clothes for my family or myself (56.3%); problems with depression or anxiety in my family or myself (48.7%); difficulty paying for medications, doctor’s visits, or medical equipment for my family or myself, and taking care of my family’s different needs and problems (45.3%)” (Osborn et al., 2014, p. 1098).

In the current study, stress is defined as having no stress to being affected by severe stress within the timeframe of the past week. The perception of stress could result in a physical, mental, or emotional stress response in which there may be worsening of disease symptoms, fatigue, anxiety, or, it could have no response at all.

Depressive symptoms. In the current study, depressive symptoms are defined as sadness, lack of experiencing pleasure, difficulty sleeping, and appetite changes, feeling badly about oneself, difficulty concentrating, and experiencing lethargy or restlessness. These depressive symptoms are negative symptoms that may hinder a person's ability to function. When depressive symptoms are severe, frequent, and long in duration, it is likely that an actual, clinical depression exists.

Process Dimension Concepts

Communication with physicians. A key to receiving quality health care is the ability of the individual seeking care to communicate well with his or her health care team (Lorig et al., 2012). Achieving effective communication between patients and health care providers is not an easy undertaking because health care professionals may use medical jargon that is not readily understood by the general population, in addition to being perceived as too busy or uninterested in the patient's health care concerns. Patients can establish positive lines of communication with their providers by clearly and consistently stating their health concerns, needs, and progress to their physicians, and by acting when they experience a change in condition, treatment, and expectations. According to Kerse et al. (2004), agreement between the physician and patient about the patient's health care concerns is linked to resolution of the patient's disease signs and symptoms. Furthermore, Kerse et al. (2004) also suggested that patient self-management is related to the physician providing preventive care, understanding the patient's psychological needs, and delivery of continuity of care. In the current study, communication with physician is defined as either written or verbal communication with the physician that was initiated by the patient to discuss their health condition, treatment and medication regimen, or to discuss any personal problems that are related to the patient's illness.

Outcome Dimension Concepts

Proximal Outcome

Medication self-management behaviors. Medication self-management behaviors (MSMB), according to DiMatteo (2004b), are more difficult to achieve due to complex medication regimens, more serious illnesses, and in individuals with resource constraints (income; education; demographic variables of age, gender and race; and access to healthcare). Furthermore, according to Bandura (2004), an individual’s “knowledge of health risks and benefits creates the precondition for change,” however, when there is a lack of knowledge about the affect lifestyle habits have on one’s health, the urgency for behavior change is likely nonexistent (p.144). Several factors play into an individual’s motivation and action to change detrimental health habits, such as, their “beliefs of personal efficacy” and motivation and action for behavior change (Bandura, 2004, p.144). Additionally, other factors, which may serve as motivators and facilitators of behavior change are rooted in an individual’s core belief that they have the capacity to produce desired changes by their own actions (Bandura, 2004).

Likewise, health behavior change is further affected by the outcomes individuals expect their motivation and action will produce, which can take several forms, including physical and behavioral outcomes that vary between positive and negative (Bandura, 2004). Morisky, Ang, Krousel-Wood, and Ward (2008) posited, poor medication taking behaviors contributed to less than ideal blood pressure control in hypertensive patients. Further, Morisky et al. (2008) found multiple factors influenced a patient’s medication taking behaviors, such as their “quality of life, complexity and side effects of their medications, healthcare system issues, demographic, behavioral, treatment and clinical variables, lack of knowledge regarding their hypertension” (p.349).

Medication self-management behaviors, according to Kripalani, Henderson and Jacobson (2006) are defined an individual's medication management capacity as, "the cognitive and functional ability to self-administer a medication regimen as it has been prescribed" (p.2). Kripalani et al. (2006) further explained that medication self-management behaviors "complements measures of adherence provided by self-report, pill count, or refill schedule" (p.2).

In their research on medication self-management behaviors among individuals taking Human Immunodeficiency Virus (HIV) therapy regimens, Smith, Rublein, Marcus, Brock and Chesney (2003) suggested successful medication self-management behaviors were related to the individual's belief in being capable (self-efficacy) of performing the behaviors. The medication self-management behaviors examined in the patients in their HIV research included, taking their medication on schedule when at home, taking their medication when the medicine caused side effects, taking their medication on time without reminders, and continuing to take their medication when they were feeling very healthy.

Morisky, Green and Levine (1986) found that patients who adapted the medication regime to their daily schedule were less likely to forget to take their medication. Furthermore, patients who sought information from their health care team to increase their understanding of their health care condition, purpose of the medication, and medication side effects, were more likely to implement medication self-management behaviors, which resulted in taking their medications successfully.

The World Health Organization (WHO) explained that there were two ways to look at medication adherence, which differs from MSMB, in that it is very narrowly associated with individuals taking medication as prescribed by their providers and not their broader roles as autonomous self-managers of their health conditions. The WHO explained that medication adherence is inclusion of process-oriented medication adherence and outcome-oriented medication adherence. Process-oriented medication adherence centered on medication self-management behaviors, specifically, keeping physician appointments, refilling medication, and the quantity and time patients took their medication. Whereas, outcome-oriented medication adherence reflected the overall success of treatment or curing the health condition being treated. Additionally, the WHO defined medication self-management behaviors as, “seeking medical attention, filling prescriptions, taking medication appropriately, obtaining immunizations, attending follow-up appointments, and executing behavioral modifications that address personal health needs, self-management of chronic health conditions, unhealthy diet and insufficient levels of physical activity” (Brown and Russell, 2011, p.18). Furthermore, the WHO posited patient-related behaviors consisted of the person’s self-efficacy to engage in managing their chronic health conditions and medication regimen. Thus, medication self-management behaviors can include remembering or forgetting to take medication; and, taking medication whether feeling better or worse, which aligns with the definition of medication self-management behaviors in the current study (Brown & Russell, 2011).

Therefore, in the current study, medication self-management behaviors are related to an individual’s knowledge of their health condition, understanding of their medication and treatment regimen, including the purpose of their medications and the mechanism of action of their medications in treating their health conditions, side effects of the medications, signs and symptoms of their health conditions that require medical intervention, and their role in activating healthcare resources for disease, medication, and treatment support. Therefore, in the current study, the definition of medication self-management behaviors include; (1) the individual’s knowledge and understanding of, and active motivation and initiative to seek information related to their medication and treatment regimen, including knowledge of the purpose of their medication, mechanism of action, and self-administration duration, dates and times; (2) the individual's awareness of, commitment to, and action in taking their medication as prescribed, unless, based on their knowledge and understanding of their health condition and medication regimen, the individual experiences a medication side effect or sign/symptoms of their illness that requires an alternative action; (3) and the individual's continuous knowledge development of their health conditions, such that they will understand the progression and/or regression of their illness, particularly the signs and symptoms of improvement and decline, the effect medication has on improving symptoms of their illness, as well as signs and symptoms that would require the individual to take action in seeking medical attention (calling advice nurse, scheduling a primary or urgent care appointment with their provider, or going to the emergency room for immediate care).

Distal Outcome

Quality of life. Redman (2013) suggested that self-management aims to influence the health knowledge, attitudes, beliefs, and behaviors of individuals in order to promote their self-reliance and to facilitate health behavior change that results in improvement in their quality of life. The World Health Organization defined Quality of Life as an individuals' perception of their station in life in regard to the values system, culture in which they live and relative to their personal goals, expectations, ideals and concerns. Moreover, the WHO suggested quality of life is an expansive concept that is affected by the complexity of the individual's physical and psychological health, beliefs, interpersonal relationships and their environment (Brown and Russell, 2011). The CDC (2011) defined QOL as a broad multidimensional phenomenon that generally includes both positive and negative aspects of an individual's life. Other aspects of QOL, according to the CDC, involve spirituality, culture, and values, which makeup the broader concept of quality of life. Consequently, researchers have suggested self-management programs can improve quality of life (Lorig, Stewart, Ritter et al., 1996). In the current study, quality of life is defined as the individual's perception of their overall well-being as it relates to their physical and mental health, social, environmental and economic state.

Significance to Nursing

Poor MSMB is a key concept in nursing practice because it has an impact on patients' health outcomes throughout the health care system. According to Lorig and Holman (2003), most attempts at integrating self-management into patient health education have only reached a small percentage of those who would benefit the most. The public health system and health care organizations, including ambulatory clinics, patient education programs, and nursing case management and care coordination programs are possible places in which MSM education could be disseminated to people with chronic health conditions. Nurses across the health care continuum, including acute care, hospital-based nurses, ambulatory or medical clinic nurses, community-based nursing groups, including cases managers, home health nurses and telehealth nurses, and nurses in sub-acute and long-term care settings, have a distinctive opportunity to provide medication self-management education to their respective patient populations. Because nurses across the continuum of health care have direct access to patients and their families in their current roles, they are in an ideal position to explore the best approach to incorporating individual and family centered medication self-management education into their practice. With their current application of the nursing process to assess and evaluate the health care needs of the patients under their care and use of assessment checklists and tools in electronic medical records, registered nurses already have a potential vehicle to add evidence-based medication self-management assessment, planning and evaluation tools to their existing clinical practice and patient care workflows.

To improve chronic care management, van Dijk-de Vries, von Bokhoven, Terluin, van der Weijden, and van Eijk (2013) asserted nurses in primary care should address three self-management tasks: medical management, emotional management, and role management. Van Dijk-de Vries et al. proposed that nurses should provide self-management support to teach patients to manage the day-to-day responsibilities of their own health condition, including applying problem-solving techniques, action planning, symptom management, decision making, and MSM. The prevalence of psychological problems, including depression and emotional stress, was higher among patients with chronic diseases, which have negative implications on MSM, health behaviors, self-efficacy, and problem solving (van Dijk-de Vries et al., 2013). In a study on the effectiveness of nurse care coordination among older adults, Marek et al. (2013) found that enhanced MSM programs are effective in improving patient self-management of medication and had a beneficial effect on the patient's cognitive functioning, depression, quality of life, and health outcomes.

Orientation to the Structure of the Dissertation

The following chapters are included in this traditional-approach dissertation. The present chapter was an introduction to the study. There are four additional chapters. Chapter 2 is a review of the literature describing the current science related to medication self-management using the IFSMT framework. This chapter establishes the basis for the analysis of MSMB contributing to self-management behaviors and outcomes. IFSMT is used to set the theoretical context and understanding of the SM concept, and to apply current MSM science relevant to context, process, and outcome factors in individuals with chronic disease and the families of these individuals.

Chapter 3 is a methods chapter that explains the correlational design of the CDSMP secondary data set analysis. In Chapter 3, empirical and theoretical methods for conducting this secondary analysis are described in a traditional format. The primary (parent) study participant demographics, variables, and questions are included, in addition to the population data, variables, and statistics being applied in the secondary analysis.

Chapter 4 is a presentation of findings related to MSM among CDSMP participants, aligned to IFSMT context and process factors and proximal and distal outcomes. Chapter 4 includes the secondary analysis study findings of the current study. The current study demographics and participant questionnaire data are analyzed and included in detail. Relational correlations between context, process, and outcome variables are analyzed.

Chapter 5 is a discussion of implications for nursing practice, knowledge development, theory, policy, and further research. In Chapter 5, a synthesis of implications for nursing practice, secondary analysis and study limitations, and an examination of policy issues generated by study findings, and opportunities for further research are presented. The findings examined in this chapter expose varied issues requiring further attention across clinical practice settings and in subsequent research.

Chapter Summary

Chapter 1 introduced the current study through a historical progression of the concept of medication self-management to establish the context for the study. Because of the nature of this research involving secondary data set analyses, Chapter 1 was intended to align the theoretical underpinnings of the IFSMT with the Stanford University CDSMP National Study and thereby set the stage for this research. In Chapter 2, a review of the literature of the current state of the science of MSMB is presented and discussed, along with concepts and factors of chronic disease self-management.

CHAPTER 2

REVIEW OF THE LITERATURE

This literature review reflects the current state of the science of MSMB, including concepts and factors of chronic disease self-management identified in the primary study, upon which this secondary analysis is based. Selective IFMST context: risk and protective factors and SM process factors were helpful in understanding the proximal and distal outcomes (medication self-management behaviors and quality of life), which provided guidance in this review. The question that drove this review of the literature was; what context and process variables are associated with MSMB and QOL in community dwelling adults with chronic disease?

IFSMT as a Framework for Clinical Practice

Ryan and Sawin (2009) conceptualized the self-management process in their descriptive, mid-range nursing theory, IFSMT as a process in which individuals and their families have at their disposal their own knowledge and beliefs, skills and abilities, and social support, social influence and social facilitation to progress or regress their health-related outcomes. Applying the IFSMT to adults with chronic health conditions enables the clinician to conduct a more effective patient and family assessment, thereby allowing the clinician to collect relevant patient and family context and process data, which supports a more collaborative relationship between the provider, patient, and family. Using the IFSMT optimizes provider collaboration, patient and family health-related outcomes, medication self-management behaviors and quality of life.

Ryan and Sawin (2009) suggested the IFSMT optimizes health promotion as a paradigm shift from historic approaches centrally focused on changing the patient's behavior alone. Furthermore, the IFSMT provides a platform for development of salient health promotion interventions and measures that leverages decades of evidence-based research and scholarship that has emerged from clinical trials, clinician practice (nurses, physicians, other clinical professionals), the health care industry at large, and patient and family case studies. Therefore, there is a substantive body of knowledge available on SM to support successful application of the IFSMT framework for clinical practice across the health care continuum.

A comprehensive search of literature yielded a total of 105 sources (Figure 3). After duplicates were removed, 85 articles were screened and 35 were excluded. A total of 55 full-text articles met the criteria for further scrutiny. Of those 55 articles, 27 articles were excluded for not meeting the inclusion criteria (which included articles with a broad perspective on medication self-management, medication self-management behaviors, medication adherence [as this concept pre-dates the use of the concept, medication self-management behaviors, and an extensive body of research in which medication adherence is used], chronic disease self-management, and chronic disease) leaving 28 articles that met all review criteria. Across the 28 studies, 19 examined MSMB or medication adherence outcomes, 2 examined action plans, 3 examined chronologic age in years, 3 examined chronic health conditions, 8 examined quality of life outcomes, 5 examined communication with physician, 3 examined depression, 1 examined education level, 3 examined ethnicity/race, 3 examined health insurance, 2 examined literacy, 1 examined marital status, and 1 examined stress (Table 1).

This literature review reflects the current state of the science of MSMB, including concepts and factors of chronic disease self-management identified in the primary study upon which this secondary analysis is based. Articles were selected for inclusion if they reported a factor of chronic disease that was the same as (or like) at least one selected from the primary study (e.g., age, ethnicity, marital status).

There were differences across studies in health conditions, settings, interventions, self-management measures and reporting, and outcomes measures. As such, there were limitations to fully aligning this review of literature to the primary study variables selected for the secondary analysis. In this chapter, the reviewed studies are organized by category (aligned with variables from the primary study that were selected for this secondary analysis), including (a) chronic condition, (b) age, (c) sex, (d) race, (e) ethnicity, (f) marital status, (g) education level, (h) insurance, (i) literacy, (j) depressive symptoms, (k) stress, (l) communication with physicians, (m) medication self-management behaviors, and (n) quality of life.

Search Strategy

The search criteria and strategy applied to the MEDLINE (PubMed) and CINAHL databases included (medication adherence OR medication self-management behaviors) in the title or abstract AND (clinical trials OR clinical trial OR randomly arranged keyword) to provide all studies on medication self-management behaviors (descriptive and experimental) The search criteria and strategy applied to the Cochrane Library database included (medication adherence OR medication self-management behaviors) AND (chronic disease self-management OR chronic condition management) AND (age in years, sex, race, ethnicity) AND (depressive symptoms, stress) AND (communication with physician, communication with healthcare team) AND (marital status OR married OR spouse) AND (. The search criteria and strategy applied to the PsycINFO database included (clinical or control or trial) AND (medication adherence or compliance OR medication self-management behaviors or patient self-care AND patient education).

Additional searches of the Web of Science (WOS), Education Resources Information Center (ERIC), Academic Search Primer (ASP), Social Sciences Abstract (SSA), and Internet searches (Google Scholar, Scorpus) were conducted for citations in the English language, with the key terms appearing randomly, using the following strategy: (random or control) AND chronic disease, chronic illness, chronic condition, chronic disease self-management, self-management, medication self-management, patient education, self-care, medication adherence, compliance, concordance, and variables (age, sex, marital status, race, ethnicity, action planning, communication with physicians, stress, and depression) from the primary study that were under review in this secondary analysis. Studies that matched the key search terms were included in the review. Bibliographies of retrieved articles were also searched for relevant articles not identified in the reference database searches (Figure 3).

Individual and Family Self-Management Theory

Context: Risk and Protective Factors

IFSMT context factors include risk and protective factors which add to self-management. Key context factors that affect community dwelling adults with chronic health conditions and their families are reflected in the following categories, condition-specific factors, physical and social environment, and individual and family factors.

Chronic Health Conditions

To determine the efficacy of administering a generic chronic disease self-management program at existing community health and social services locations, Lorig, Ritter, Ory, and Whitelaw (2013) recruited 114 adults with Type 2 diabetes who previously participated in a national CDSMP study to be part of their longitudinal, prospective, translation study. Depression was significantly improved at 6 months and improvement was sustained at 12 months. At 6 months, communication with physician improved, with trending toward significance (*p*=.087). Both quality of life and medication self-management behaviors improved at 12 months, *p*=.067 and *p*=0.057, respectively.

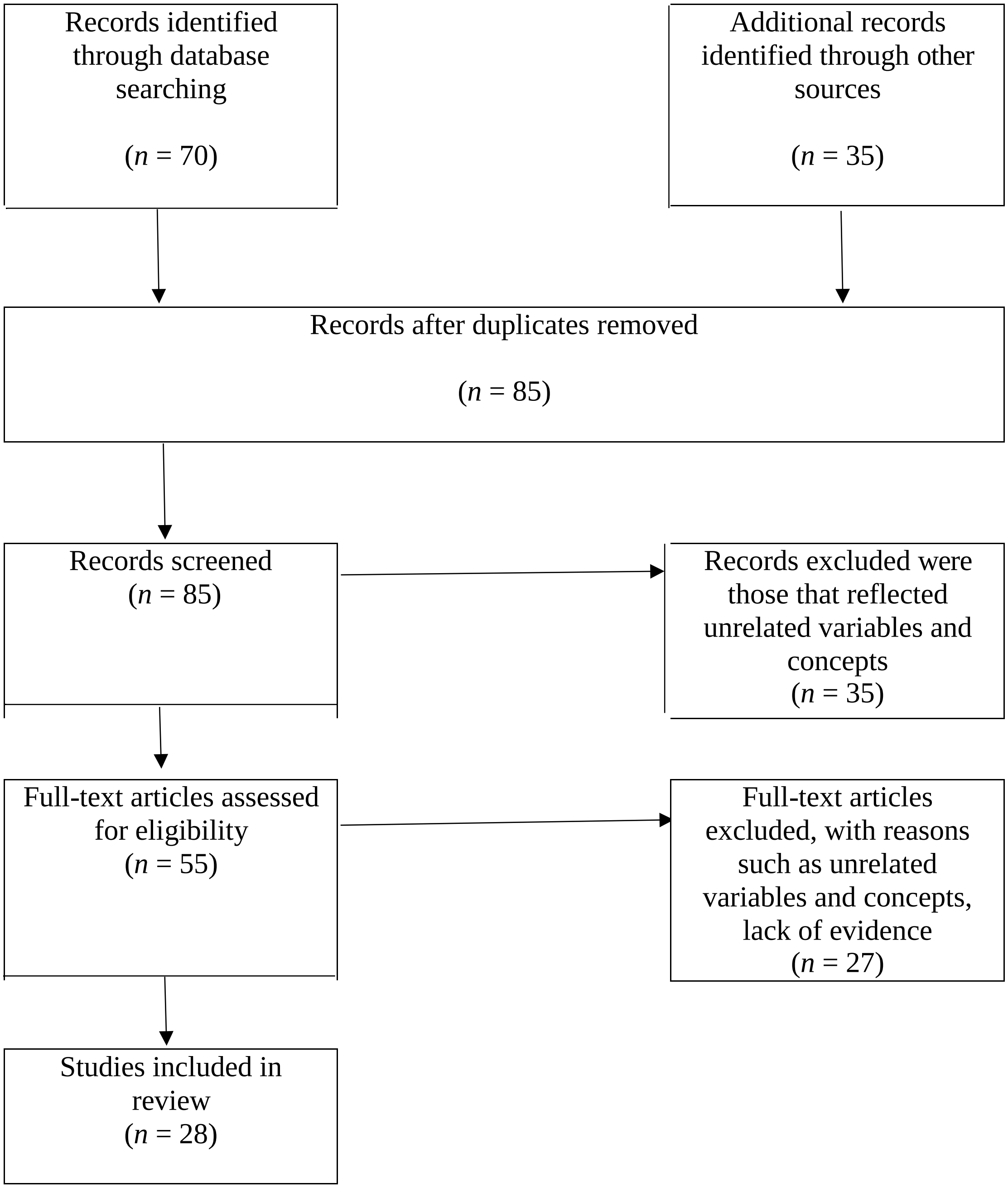

Figure 3. PRISMA flow diagram of literature review search. Adapted from "Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement," by A. Liberati et al., 2009, *PLoS Med, 6,* Art. No. e1000097. Copyright 2009 by PLoS.

In a secondary analysis, Ritter et al. (2014) found that the CDSMP intervention resulted in long-term improvements in participants with higher depression scores. In fact, Ritter et al. reported that the results from their small-group and online CDSMP translational studies were equally successful self-management applications for participants diagnosed with depression. At 6 months, participants in the CDSMP National Study also reported decreased symptoms of depression, in addition to an increase in weekly physical activity from 166 to 181 minutes from baseline (Ory, Ahn, Jiang, Lorig et al., 2013).

Physical and Social Environment Factors

Ryan and Sawin (2009) posited, "environmental factors are physical or social and include factors such as access to healthcare, transition from on healthcare provider or setting to another, transportation . . . school, and culture," among others. In the current study, physical and social environment factors included health care access (insurance type), and culture (Hispanic ethnicity and race) were examined in relationship to medication self-management and quality of life outcomes (p.223).

Insurance

To understand the health consequences of restricting medications due to cost (e.g., among those with no insurance, insurance with no drug coverage, insurance with partial or full coverage) Heisler et al. (2004) investigated the high out-of-pocket costs for prescription medication, particularly among patients with chronic diseases. Data were analyzed from two prospective, adult cohort studies: (a) the Health and Retirement Survey (HRS) of adults 51 to 61 years of age, and (b) the Asset and Health Dynamics Among the Oldest Old (AHEAD) study of adults 70 years of age and older. Heisler et al. studied 7,991 participants (3,649 from AHEAD and 4,323 from HRS) in their secondary analysis. The independent variable was medication self- management behaviors and the covariates included education level, age, sex, race, heath status, and presence of comorbid conditions. Participants (32.1%) who restricted their medications because of cost reported a significant health decline, compared with 21.2% of participants who did not restrict their medications (adjusted odds ratio [AOR], 1.76; confidence interval [CI], 1.27–2.44; Heisler et al., 2004). When adjusting for age in an analysis of health outcomes, participants 72 and older who restricted their medications because of cost had a 92% higher likelihood of significant health decline (44.7% versus 29.7%; AOR = 1.92; CI = 1.21–3.04). Higher risk of depression was also found in older participants (AOR = 1.16, CI = 1.02–1.31).

Ngo-Metzger et al. (2011) conducted a randomized, controlled trial of racially/ethnically diverse adults (*N* = 1,361: 194 Vietnamese, 249 non-Hispanic Whites, and 533 Mexican Americans) with Type 2 diabetes to examine whether having health care insurance reduced the financial challenges associated with diabetes care. More than half (53.2%) of Mexican Americans were found to have cost-related medication nonadherence, compared to 27.6% of Vietnamese, and 27.2% of Whites. Participants with high out-of-pocket prescription medication cost (AOR = 1.37, CI = 1.2–2.57), actual and perceived financial barriers, and no health care insurance (AOR = 1.79, CI = 1.03–3.11) were more likely to be nonadherent to prescription medication because of cost.

Ethnicity/Race

In a quantitative, cross-sectional, secondary data analysis national study (from a national study conducted in 2003 at the Health Institute at Tufts-New England Medical Center), Gellad, Haas, and Safran (2007) sought to determine the reasons and rates of poor medication self- management behaviors among a racially and ethnically diverse senior adult population (*n*

= 14,829: *n* = 12,313 White; *n*= 1,603 Black; *n* = 913 Hispanic) of Medicare beneficiaries 65 years of age and older. Gellad et al. found that Blacks (35.1%) and Hispanics (36.5%) were more likely than Whites (26.7%) to experience cost-related poor medication self-management behaviors. After controlling for age, gender, chronic conditions, medications, health insurance coverage, and education, Blacks (OR = 1.38; 95% CI = 1.08–1.78) and "Hispanics (OR = 1.35; 95% CI = 1.02–1.78) remained more likely to report cost-related nonadherence compared to Whites" (Gellad et al., 2007, p. 1572).

Kripalani et al. (2008) conducted a qualitative observational study among 84 inner-city patients to better describe their use of prescription medication and their challenges with MSMB following hospital discharge. The participants were mostly Black/African American (*n* = 74, 88%), middle-aged (54.5 mean age), and male (*n* = 49, 58%). Participants were interviewed by phone and had follow-up interviews at approximately 8 to 18 days after the initial interview. Most patients reported that they delayed filling their discharge prescription because of (a) difficulty paying for their medications (35%), (b) difficulty arranging transportation to the pharmacy (38%), and (c) long pharmacy wait times (63%). Some patients (21%) reported having difficulty understanding the need for their new medications, while 11% reported not fully understanding how to take their medicines, and 16% expressed having difficulty reconciling pre- hospital admission and post-hospital discharge medication prescriptions—all of which led to discharge medication nonadherence (Kripalani et al., 2008). Smith, Cho, Salazar and Ory (2013) followed a pre-post study design to examine quality of life changes among racially/ethnically diverse CDSMP attendees (*n* = 136 adults) from baseline to 6-month post-intervention follow-up. Participants self-identified as non-Hispanic White (54%), Black/African American (14%), and Hispanic (32%), were predominately female (86.0%), and had a mean age of 73.2 years. More than 71% reported having greater than a high school education and being unmarried (61%). Hispanic (7.00 ± 10.41) participants reported the greatest improvement in quality of life, followed by African Americans/Black (2.94 ± 9.92), while non-Hispanic Whites (.18 ± 7.65) showed less improvement than both Hispanics and Black/African Americans.

Individual and Family Factors

Ryan and Sawin (2009) indicated, “individual and family factors are those characteristics of the individual and family directly” (p. 223), including factors that “enhance or diminish self- management,” (p. 225.e5; e.g., perspectives and family capabilities). In a community-based peer-led diabetes self-management program (DSMP) randomized trial, Lorig, Ritter, Villa, and Armas (2009) found that participants had significant improvements in communication with physicians (process variable) and with their depressive symptoms. During the DSMP study, the peer leaders covered topics that included making an action plan, communication, working with one’s health care professional, feedback, and problem solving. In this highly interactive DSMP study, the skill-building techniques emphasized were reinforcing action planning and problem solving. At the 12-month follow-up assessment, participants continued to show significant improvement in the communication and depressive symptoms outcome variables.

Age and Sex/Gender

Henriques, Costa, and Cabrita (2012) explored medication management among community-dwelling elderly persons with chronic conditions in a descriptive qualitative study using a focus-group methodology in which verbatim narrative comments were categorized by theme. Four categories emerged: (a) living with drugs, (b) beliefs about medications, (c) taking medications/consumer multiple drugs, and (d) relationships with health care staff. Select subcategories that emerged included medication self-management behaviors, relationship with doctor, and lifestyle. Participants described how they incorporated medication-taking routines into their daily schedules, including adjustments they made when on vacation or engaging in social activities. One participant indicated, “I know I have to take medicine forever,” while another reported, “the drugs I have taken have been great” (Henriques et al., 2012, p. 3099).

Some participants indicated they deliberately missed taking their medication doses because of not being able to afford it, feeling better and not wanting to take it, and believing it was okay to miss taking it for “two or three days” (Henriques et al., 2012, p. 3100). Study participants noted that having a nurse available to explain the medication regimen, answer questions, and provide consultation made the participants feel more confident with managing their medications. They also expressed feeling privileged to have the relationship with the nurse, which participants described as collaborative, compassionate, and a “very important helping factor” in enabling them to successfully self-manage their medicines (Henriques, Costa, & Cabrita, 2012, p. 3101).

In a pre- and post-treatment randomized, controlled trial in which CDSMP was used as the intervention, Jonker, Comijis, Knipscheer, et al. (2015) examined the benefits for 132 elders with vulnerable health (63 in intervention group, 69 in control group). At the 6-month follow-up, self-efficacy and valuation of life worsened for the control group but remained stable for the intervention group (p<0.1), and depression decreased significantly in the intervention group (p <.05).

Meranius and Hammar (2016) used a qualitative research design to examine 20 older adults (76–83 years of age) with multimorbidity using in-depth interviews and Gadamer’s hermeneutic methodology to achieve a deeper understanding of the MSMB experiences of this population. Participants reported that conversations with their physicians about their health care circumstances and needs increased their knowledge and self-care (e.g., managing their chronic conditions if they were not too ill and did not have multiple providers) capabilities. They also indicated feeling less confident with self-care when their symptoms were more acute. Participants reported that short doctor's office visits (20 minutes or less) was not enough time to fully discuss their health care situation and gain substantive knowledge, confidence, or support for their successful self-care.

Educational Level

In a study involving patients with heart failure and lower education levels, Smeulders, van Haastregt, Ambergen, et al. (2010) conducted a secondary data analysis of a two-group randomized controlled trial. Senior adults (*n* = 317) with a mean age of 68.1 years were enrolled in CDSMP workshops across six hospitals in the Netherlands. Smeulders et al. (2010) reported "A significant subgroup effect was found for educational level (*p* = 0.0018) in favour of lower educated patients, indicating that lower educated patients benefitted more from the programme" (p. 219). Cardiac quality of life improved among congestive heart failure (CHF) participants with better cognitive status but was limited to the short term, while quality of life was sustained longer for lower educated CHF patients.

Literacy

Gazmararian, Kripalani, Miller, et al. (2006) conducted a prospective cohort study (*n* = 1,549) in which they examined factors of medication self-management in participants with cardiovascular diseases. They found that low literacy affected 40% of new Medicare enrollees from four managed care plans (Gazmararian et al., 2006). Ethnicity/race, complexity of treatment, and educational level were significantly related to medication self-management behaviors ($p < .05$). In bivariate analysis, researchers found a significant, inverse association between literacy and MSMB. Participants with low medication refill adherence (27.3%) had inadequate literacy, when compared to 21.9% of participants with adequate medication refill adherence.

In a randomized trial, Kripalani et al. (2006) conducted a cross-sectional analysis of predictors of MSMB in an inner-city population (n = 152, 54.6% women, 94.1% Black/African American, mean age 65.4 years) with low literacy. Findings included a statistically significant association between medication self-management behaviors and literacy, and patients with inadequate literacy to have 10 to 18 times higher odds of not being able to identify any of their prescribed medications.

Married

Aikens et al. (2014) conducted in a quasi-experimental study involving 98 nonadherent patients diagnosed with diabetes. The purpose of the study was to investigate the benefits of involving patient-selected support persons into a telehealth monitoring program. Patients who elected to involve a “support person demonstrated significantly greater improvement in long- term adherence than those who participated alone” (Aikens et al., 2014, p. 319).

DiMatteo (2004a) conducted a meta-analysis review of the literature from 1948 to 2001 that involved 122 studies and identified “51 studies correlating marital status with adherence,” which reflected “effect sizes ranging from -.25 to .44, with a median of .00” (p. 211). The likelihood of successful medication self-management behaviors among married patients was 1.27 times higher than in unmarried patients, and the risk of poor medication self-management behaviors was 1.13 times higher among unmarried participants than among married participants (DiMatteo, 2004a).

Depressive Symptoms and Stress

Depressive symptoms

Lorig, Ritter, Pifer, and Werner (2013) sought to determine the effectiveness of using the CDSMP for persons with serious mental illness. Persons with persistent mental illness (e.g., major depression, schizophrenia, schizoaffective disorder, bipolar disorder, and individuals with both mental health conditions and substance abuse issues) were recruited from the Michigan Community Mental Health Services division to participate in the study. The study participants included 133 adults with the following characteristics: 48.2 mean age, 13.0 mean educational level, 18.0% married, 24.1% Black/African American, 73.8% non- Hispanic White, and 2.1% Hispanic, and 7.1% without insurance. At the 6-month follow-up after the intervention (CDSMP), eight of 10 health indicators, including quality of life, PHQ depression, communication with physician, and medication self-management behaviors had statistically significant improvements. Effect sizes reflecting improved outcomes spanned 0.22 to 0.42. The effect sizes for select improvements included quality of life (0.292), PHQ depressive symptoms (0.373), communication with physician (0.249), and medication self-management behaviors (0.301).

Ritter, Ory, Laurent, et al. (2014) studied 285 individuals (175 = small group, U.S. national study; 110 = Internet-based, Healthy Living Canada study) with depression to determine (a) their baseline PHQ-8 depression levels, (b) whether changes occurred in their PHQ-8 depression levels after completing the CDSMP, and (c) if there were differences in outcomes compared to participants without depression. At baseline, 27% of the U.S. group and

55% of the Healthy Living Canada group had PHQ-8 of 10 or greater. At 12 months, PHQ-8 improved for both the U.S. group (dropped to 15.7% of 10 and above) and Healthy Living Canada group (36.8% of 10 and above). The U.S. group improved in four out of six outcome variables (pain, fatigue, activity level, and medication self-management behaviors) at 12 months, while the Canada group improved in all outcome variables (pain, fatigue, activity level, medication self-management behaviors, and number of emergency room visits) but one (number of hospitalizations) at 12 months.

In a quantitative, descriptive study of 128 English-speaking adults, Tamburrino, Nagel, Chahal, and Lynch (2009) examined adherence to antidepressant medication to better understand factors associated with nonadherence. Baseline participant PHQ depression was 8.8% for dysthymic disorder (*n* = 13), 31.8% for major depression (*n* = 47), and 29.7% for double depression (both dysthymic and major depression combined, *n* = 44). Tamburrino et al. (2009, p.209) found "stages of change level and acknowledging some carelessness in taking medication" were the strongest predictors of medication nonadherence ($p = .047$).

In a longitudinal (12-month), single-group design, translation study, Lorig et al. (2016) examined 1,242 adult participants with Type 2 diabetes from two CDSMP modalities—Internet (1,010 participants, mean age 65.6 years), and face-to-face (232 participants, mean age 55 years) to determine the impact of CDSMP on participants' depression/depressive symptoms, among other health factors. At baseline assessment, 22% (193/877) indicated having symptoms of depression (PHQ-8 score of ≥10), which reduced to 16.3% at 6 months (144 participants, $p < .001$). The mean PHQ-8 reduction at 6 months was 3.87 ($p < .001$, effect size = 1.1; Lorig et al., 2016).

Stress

Osborn et al. (2014) conducted a quantitative, cross-sectional study of 314 English- and Spanish- speaking adults with Type 2 diabetes to examine relationships between stressors (using the Tool for Assessing Patient's Stressors [TAPS] they had experienced in the past 12 months and their self-care behaviors (using the Summary of Diabetes Self-Care Activities [SDSCA] and Adherence for Refills and Medications Scale for Diabetes [ARMS-D]). Demographics of study population were as follows: 70% were women, 56% were Black/African American, 10% were Hispanic, 47% did not have health insurance, and 31% did not complete high school (Osborn et al., 2014). Osborn et al. 92014) concluded, based on the study findings, that "Having more stressors was significantly and strongly associated with more depressive symptoms (rho = 054, *p* <.001)" (p. 36). After adjusting for diabetes characteristics and demographics, participants who reported more stressors were found to exhibit poor medication self-management behaviors (ß = -.38, *p* <.001 unadjusted; ß= -.36, *p* <.001 adjusted).

Process Factors: The Self-Management Process

Process dimension factors of self-management, according to Ryan and Sawin (2009), are drawn from the Institute of Medicine report on health and behavior and have a basis in health behavior theory, research, and practice. The IFSMT model was inspired by health behavior change theories including self-regulation, social support, and self-management research in chronic health conditions. Process factors influence on an individual's and the family's ability to actively engage in health behaviors, accept health beliefs, build self-regulations skills to enhance health behaviors, and expand social facilitation opportunities to better navigate social realms in support of attaining healthier lifestyles (Ryan & Sawin, 2009).

Health outcomes become more positive when individuals and their families are more successful with the self-management process (Ryan & Sawin, 2009).

Communication with Physicians

Five separate studies involving physician-patient communication were reviewed for the current study. Kerse et al. (2004) examined the impact of physician-patient relationships on medication self-management behaviors in 220 patients who were surveyed among 22 general practice waiting rooms in Netherlands. Trust and physician-patient concordance was independently and significantly associated with medication self-management behaviors.

DiMatteo, Hays and Prince (1986) found high levels of correlation between patient-physician interaction, support given to the patient across a variety of environments, and medication self-management behaviors. Oyekan et al. (2009) conducted a case study of five Kaiser Permanente Northern California patients with chronic health conditions to better understand their experiences with MSM. Poor relationships with clinicians and forgetfulness were among reasons given by the participants for medication misuse. Ratanawongsa et al. (2013) investigated possible relationships between patient communication ratings of physicians and their cardiac medication refill adherence. They used a cross-sectional analysis to examine 9,377 patients in a Northern California diabetes cohort study. Their findings confirmed “poor communication ratings were independently associated with objectively measured inadequate cardiometabolic medication refill adherence” (Ratanawongsa et al., 2013, p. 210). Sleath et al. (2015) examined ophthalmologist-patient communication to determine glaucoma medication self-management outcomes. They found that “Black/African American patients were significantly less likely to be adherent” compared to non-Black/African American patients, and when physicians "gave positive medication reinforcement" to their patients at one or more appointments, patients were significantly more likely to be adherent (Sleath et al., 2015, p. 700).

In the pre-post longitudinal design CDSMP National Study, Ory, Ahn, Jiang, Smith et al. (2013) found significant improvements among participants' health care experience, indicated by improved communication with their physicians and more successful medication-taking behaviors. Ory, Ahn, Jiang, Smith et al. perceived improvement in physician-patient communication as a key factor in improving medication use. Ory et al. (2014) evaluated age related outcomes in the CDSMP National Study and found that improved health outcomes were more prevalent among participants between 50 and 64 years of age (middle-aged cohort who were mostly Black and Latino/Hispanics), particularly communication with doctors and the level of their depression. Blacks and Latino/Hispanics had greater quality of life improvements as compared to their non-Hispanic Whites counterparts (65+ cohort) who did not experience a change from baseline to 12-month assessment in overall quality of life.

Outcomes: Proximal and Distal

Outcome dimension factors of self-management, according to Ryan and Sawin (2009), are both proximal (engagement in self-management behaviors) and distal (involve favorable completion of proximal outcomes). IFSMT outcomes span three separate categories including health status, quality of life (perceived well-being), and health care system costs. Health outcomes become more positive when individuals and their families are more successful with the self-management process (Ryan & Sawin, 2009). Individual and family self-management behaviors and quality of life are categories under the IFSMT outcomes dimension and are discussed below.

Proximal Outcome

Individual and family self-management behaviors

Individual and family engagement in activities including health treatment, medication self management behaviors, and managing health-related symptoms are inclusive of the SM process and are discussed below.

In a Cochrane review of 182 randomized controlled trials (RCTs), Nieuwlaat et al. (2014) sought to answer the following question: “What are the findings of high-quality studies that tested ways to assist patients with adhering to their medicines?” (p. 1). The findings could not be statistically combined because there were misaligned samples, treatments, adherence intervention types, medicine adherence measurement, and clinical outcomes. Medication self-management interventions were noted as complex, incongruent, and inclusive of variations on types of support, education and counseling approaches, and outcomes related to medication self-management.

A lack of identifiable common characteristics among five of the studies that reported improved medication self-management behaviors and clinical outcomes resulted in a lack of clarity regarding the way behaviors or constructs effected change, if and how external support contributed to success, provider or health care system impacts, or other extraneous factors having impact. Initially, in their Cochrane review, Nieuwlaat et al. (2014) included the following five randomized controlled trials (RCTs) in their systematic review, however, the RCTs were eventually eliminated as they did not fully address important areas of medication self-management. First, RCTs Canto, Canto, and Luna. (2001), and Ran, Xiang, Chan, Leff, Simpson, and Huang (2003) did not clearly addressed the components of medication self-management among participants in their trials. While, less than 80% follow-up among participants in Van Servellen and Lombardi's (2005) research on medication self-management halted its inclusion in the Cochrane review. Nieuwlaat et al. (2014) set out to review RCTs reporting medication self-management behaviors and outcomes, which is why it excluded the work of Van Es (2001) as there was no outcome data reported in Van Es's article. Finally, Piette, Weinberger, Kraemer, and McPhee. (2001). research was excluded as it was considered to be "confounded" by Nieuwlaat et al. (2014), and, therefore, not aligned with the Cochrane research of Nieuwlaat et al. (2014).

Distal Outcome

Quality of life

Redman (2013) suggested that self-management aims to influence the health knowledge, attitudes, beliefs, and behaviors of individuals in order to promote their self-reliance and to facilitate health behavior change that results in improvement in their quality of life. The World Health Organization defined Quality of Life as an individuals' perception of their station in life in regard to the values system, culture in which they live and relative to their personal goals, expectations, ideals and concerns. Moreover, the WHO suggested quality of life is an expansive concept that is affected by the complexity of the individual's physical and psychological health, beliefs, interpersonal relationships and their environment.

In a study in which 22 participants were administered a self-efficacy and quality of life questionnaire, prior to 64% completing the CDSMP workshop, Crosby, Joffe, and Britto (2016) found that patient activation 3 months after the intervention was not sustained. There was an improvement among the sample in general self-efficacy but not in disease self-efficacy, which may have been related the severity of the sickle cell disease stages across the participants. Likewise, there was no substantial improvements in self-management behaviors or quality of life among this sample. As seen in other CDSMP studies, these researchers indicated a limitation may have been the lack of a control group as well as single site recruitment (Crosby et al., 2016).

In a study of 132 participants with chronic health conditions, Jonker, Comijs, Knipscheer, and Deeg (2015) found that as their depressive symptoms increased, perception of their quality of life decreased. Lorig, Ritter, Turner, English, Laurent, and Greenberg (2013) studied 884 people who participated in CDSMP Internet and in person workshops and found that depressive symptoms and general health/wellbeing were significantly improved at the six-month measurement point after enrollment in the program.

In a nurse led six-week self-management program, Smeulders, Haastregt, Ambergen, Gorgels, Stoffers, Lodewijks (2010) studied 371 people with congestive heart failure and found improvement the program across the participants in cardiac-specific quality of life and self-management behaviors. However, the results were not sustained when measured at six- and 12-month after the program concluded. In a study by Smith, Cho, Salazar, and Ory (2013), 160 racial diverse adults with at least two chronic health conditions, it was found that the overall health related quality of life improved across the sample. In fact, the greatest improvement was seen among Black/African American and Hispanic individuals, as compared to their Caucasian/White counterparts (Smith et al., 2013).

Chew, Sidik, and Hassan (2015) conducted a cross-sectional study in which 667 participants (Malay=367; Indian=165; Chinese=162; Aborigine=3; and Other=3) with type 2 diabetes were examined for diabetes-related distress, depressive symptoms, medication self-management behaviors, and health-related quality of life (HrQOL). Overall, it was found that HrQOL was associated with better health outcomes, including total cholesterol level, improved blood pressure and lipids, and overall disease control. Hacihasanoglu and Gozum (2010) studied

12 Turkish participants for the effects of patient education and home monitoring on health outcomes and healthy lifestyle behaviors. The participants were spread into 2 intervention groups (group A received 6 in person educational sessions on medication self-management behaviors; group B received additional education on health lifestyle behaviors) and 1 control group (control group participants were interviewed 6 times, after taking a pretest, and had their blood pressure and weight measured once). Both intervention groups improved significantly in there HrQOL/Health promoting lifestyle profile scale. Likewise, all groups experience improvement in quality of life and improved health outcomes, including improved systolic and diastolic blood pressures and basal metabolic indices (BMI) after the intervention. In the above 8 studies, improvement was seen across each sample in quality of life, and, overall, in health outcomes. However, in the Smeulders et al. (2010) study, the results were not sustained. Jonker et al. (2015) found that as depressive symptoms increased across study participants, their perception of quality of life decreased. Crosby et al. (2016) also found an association between quality of life and disease severity.

Discussion

Interventions Targeting Context, Process and Outcomes Variables

Six studies using a version of the CDSMP found that this intervention successfully targeted both context (depressive symptoms) and process (communication) variables and to a lesser extent on proximal (MSMB) and distal (QOL) outcomes. As Lorig, Hurwicz, Sobel, Hobbs, and Ritter (2005) explained, “While there is widespread belief in the importance of self-management programs for people with chronic conditions, these programs will only fulfill their potential” (p. 69) when these programs have been shown as efficacious through successful replication, dissemination, and implementation. Further, Lorig et al. (2005) purport, “very little is known about the factors that help both help and hinder dissemination of these programs in ‘real-world’ settings” (p. 69).

Table 1. Summary of Evidence

Study	Sample	Factor	ES	OR	LCL	UCL	CL%	Outcome
Aikens et al., 2014	301	Marital status		0.25	0.07	0.43	95	MSMB
Coulter et al., 2015	19	Action plan		0.16	-0.05	0.38	95	QOL
Crosby et al., 2016	22	Chronic disease				ND		QOL
DiMatteo, 2004a	122	Marital status		1.27	1.12	1.43		MSMB
Gazmararian et al., 2006	1,549	Literacy		1.37	1.08	1.74	95	MSMB
Gellad et al., 2007	14,892	Ethnicity/race		1.38	1.08	1.78	95	MSMB
Heisler et al., 2004	7,991	Insurance		1.5	1.09	2.09	95	MSMB
Henriques et al., 2012	9	Age				ND		MSMB
Jonker et al., 2015	169	Age				ND		QOL
Kerse et al., 2004	220	Communication		1.34	1.04	1.72	95	MSMB
Kripalani et al., 2006	152	Literacy		12.00	2.57	56.08	95	MSMB
Kripalani et al., 2008	84	Ethnicity/race				ND		MSMB
Lorig, Ritter, Ory et al., 2013	114	Depression				ND		MSMB
Lorig et al., 2014	277	Action plan				ND		QOL
Lorig, Witter, Pipfer et al., 2013	133	Chronic disease (T2D)				ND		MSMB
Lorig et al., 2016	1,010	Chronic disease	0.125		0.201	0.073	95	QOL
Meranius& Hammar, 2016 (Qual.)	20	Age				ND		MSMB
Morisky, Green, & Levine, 1986	290	Communication				ND		MSMB
Nieuwlaat et al. (2014)	182	Chronic Disease				ND		MSMB
Ngo-Metzger et al., 2011	1,391	Insurance		1.49	1.06	2.08	95	MSMB
Osborn et al., 2014	314	Stress				ND		MSMB
Oyekan et al., 2009 (Qual.)	5	Communication				ND		MSMB
Ratanawongsa et al., 2013	9,377	Communication		0.40	0.00	7.00	95	MSMB
Ritter et al., 2014	285	Depression				ND		QOL
Sleath et al., 2015	279	Communication		1.10	1.02	1.79	95	MSMB
Smeulders et al., 2010	317	Education level		1.35	1.02	1.78	95	QOL
Smith et al., 2013	136	Ethnicity/race				ND		QOL
Tamburrino et al., 2009	148	Depression				ND		MSMB

Note. CL = confidence level. UCL = upper confidence level. LCL = lower confidence level. ES = effect size. MSM = medication self-management. QOL = quality of life. ND = no data. OR = odds ratio. Qual = qualitative study.

Chapter Summary

Twenty-eight studies were included in this review of the literature, to examine medication self-management behaviors of community dwelling adults with chronic health conditions. Nineteen separate studies addressed the proximal outcome of medication self-management behaviors, while eight separate studies centered on the distal outcome, quality of life. The selected context: risk and protective factors (chronic health conditions, health care access, culture, developmental stages, learning ability, literacy, family structure and functioning, and capacity to self-manage) were the central focus of this review, in addition to the process variable, communication with physicians, and their relationships to the outcomes variables, medication self-management behaviors and quality of life. These studies reflect variations of conceptual definitions of medication self-management behaviors, quality of life, as well as methodological and operational differences such as (a) whether study designs were quantitative or qualitative, and randomized or longitudinal; (b) differences in study populations and duration of follow-up; and (c) variations in administration format and location. This review also reflected significant improvements in MSMB for participants experiencing optimal communication with physicians, particularly when physicians were fully engaged and when they utilized appropriate resources to support patients and their family members. Many of the MSMB effects were improved for individuals who were married, older, and who had moderate to high education levels, advanced literacy, and adequate prescription insurance coverage.

The IFSMT is well suited as a tool for the nurse and other clinicians who care for adults with chronic health conditions because it provides a framework for applying individual and family self-management with its guidelines for assessing the context and process factors of individuals and family diagnosed with chronic health conditions. In Chapter 3, the primary study and current study methods are discussed.

CHAPTER 3

METHODS

In this chapter an overview of the primary study is provided. The design, sample and procedures of the primary study are summarized. The methods of the current study are described. Data management including data analytical approaches are provided. The chapter concludes with human subject protection and study limitations.

Primary Study

The original Chronic Disease Self-Management study was conducted from 2010 to 2011 by Stanford University School of Medicine. The sample consisted of 1,170 community-dwelling individuals who were diagnosed with at least one chronic disease and were enrolled from among 22 different Stanford University-licensed CDSMP organizations located in 17 states across the United States. Each of the CDSMP sites recruited study participants according to its usual approaches, which included referrals from local organizations and self-referrals from recruitment efforts (e.g., posting flyers, brochures, and health fairs). Participant eligibility included (a) having at least one chronic disease, (b) enrolling in a CDSMP workshop, (c) attending a minimum of one of the first two CDSMP workshop sessions, (d) having no previous exposure to a CDSMP workshop, (e) completing a baseline assessment, and (f) consenting to the study (Ory, Anh, Jiang, Lorig, Ritter, Laurent, 2013).

The CDSMP National Study was a pre-post longitudinal design conducted over 12 months to determine the impact of the intervention on the sample (Ory, Anh, Jiang, Smith, Ritter et al., 2013). The primary study did not include a control group. In the primary study, participants from three workshop types (CDSMP, *n* = 807; Tomando, *n* = 213; and Black/African American, *n* = 150) were enrolled. According to Stanford University CDSMP principals, the all-inclusive CDSMP and the CDSMP Black/African American workshops were identical (CDSMP, 2010). Tomando, a Stanford University chronic disease self-management workshop that was translated into Spanish, is like the other workshop types; however, it is not identical. It has Spanish cultural approaches that are not included in the CDSMP workshop, which is an all-inclusive workshop type. Some participants attended the Black/African American workshop type, which is identical to the all-inclusive CDSP workshop type with the only difference being that the Black/African American workshop was offered in community centers (with persons of color serving as the workshop leaders) in predominately Black/African American communities. In the primary study sample (*n* = 1,170), 891 participants self-identified as White, while 193 self- identified as Black/African American. Participants self-identifying in racial groups other than White and Black/African American, were grouped together in the racial category of Other. This other racial category includes Asian, American Indian, Hawaiian/Pacific Islander, two or more races, and other.

Intervention

The intervention in the primary study consisted of the 6-week CDSMP workshop, in which participants enrolled and participated in the CDSMP usual workshop. The workshop was led by two certified leaders, one of whom was a peer leader diagnosed with at least one chronic disease, and the second leader, a master trainer, trained in the Stanford CDMS protocol, was commonly selected from among the trained agency staff. Subjects covered in the workshop included: (a) approaches to address fatigue, pain, depression, and seclusion; (b) understanding and properly using medication; (c) effective communication with physicians and other providers; and (d) appropriate exercise and diet planning for health promotion (Ory et al., 2013). The study included primary outcome measures of MSMB behaviors, communication with physicians, and depression. Findings across several studies reflect that application of the

CDSMP intervention on outcome measures such as quality of life, communication with physicians, depression, and MSMB resulted in favorable outcomes.

Using evidence-based behavior change theories, including Bandura's social cognitive theory of self-regulation (SCT), the CDSMP was administered in workshop format within small groups, meeting in a weekly class for 2.5 hours over 6 weeks. Behavior concepts of focus included action planning, problem solving, goal setting, and decision making (Ory, Ahn, Jiang, Lorig et al., 2013).

Current Study Methods

Design

A correlational longitudinal study design was used in this secondary analysis of the Stanford University national study of the CDSMP. In this secondary analysis, only participants from the CDSMP (*n* = 807) and Black/African American (*n* = 150) workshop types were included, which was a potential sample size of 957. Those from the Tomando workshop type were not included in the current analysis because this workshop had a different Spanish cultural approach that was not included in the CDSMP workshop. All cultures, ethnicities, races were able to participate in the CDSMP workshop, including participants who self-identified as White, Black/African American, Asian and of Hispanic ethnicity).

Sample

The de-identified data set contained a sample of 957 cases. The data were reviewed for presence of the outcome variables of MSMB and quality of life at all measurement points (baseline, 6, and 12 months). The descriptive data were reviewed for completeness, missing data, and distribution patterns. After the sample was defined based upon presence of the outcome variables, the predictor variables were reviewed to determine the presence of missing data. No reviewing of degree and randomness of missing data was done for any of the outcome variables.

No imputation was done for any of the outcome variables. Therefore, the eligible sample in the current study was based upon the number of participants with complete data for any of the outcome variables of medication self-management behaviors or quality of life at all the measurement points of baseline, six-months, and 12-months. Due to incomplete/missing outcome data, the sample was reduced by 341 participants. Participants not included in the final sample of the current study included 277 who had data missing completely at random across all variables, while 64 were missing data at the 6-month measurement period. Thus, the final sample in the current study included the 616 participants who completed the outcome measures at baseline, 6 months, and 12 months. Makes me wonder what the differences were between those they excluded for missing data and those they included.

Table 2. *Descriptive Statistics of the Sample of (n=616)*

Variable	*M* (*SD*)	Frequency (%)
Age (years)	67.6 (11.17)	
Sex (male)		112 (18.2)
Race/ethnicity		
White		465 (75.5)
Black		104 (16.9)
Other		45 (7.3)
Missing		2 (0.3)
Hispanic		30 (4.9)
Education level	14.0 (3.04)	
Married		243 (39.4)
Insurance coverage		586 (95.1)

Note. *M* = mean. *SD* = standard deviation. SM = self-management. QOL = quality of life.

Table 2 shows the descriptive statistics. Mean age of participants was above 67 years. Almost 20% of participants were male, more than 75% were White, and fewer than 5% were Hispanic. Mean education was college level. Fewer than half were married and almost all had some type of health insurance coverage.

Measures

Table 3. *IFSMT Constructs*

IFSMT construct	CDSMP study variable	Variable type
Context variables		
Condition-specific factors	Total score of chronic condition diagnoses	continuous
Physical and social environment	Insurance type	categorical
	Hispanic (ethnicity)	categorical
	Race	categorical
Individual and family factors	Age (Age in years, 19 to 80)	continuous
	Sex (gender)	categorical
	Educational level	continuous
	Literacy	continuous
	Marital status	categorical
	Stress (VNSSTRS)	continuous
	Depressive symptoms (PHQ-8)	continuous
Process variables		
Social Facilitation: social influence, support (emotional, instrumental or informational), negotiated collaboration	Communication with physicians: DOC-1: Prepare a list of questions for your doctor; DOC-2: Ask questions about the things you want to know and things you don't understand about your treatment; DOC-3: Discuss any personal problems that may be related to your illness	continuous
Outcome variables	Medication self-management (MMAS-4)	continuous
Proximal: Individual and family self-management behaviors: Use of recommended pharmacological therapies		
Distal: Quality of life: Perceived well-being	Quality of life (VNSQOL)	Continuous

Note. IFSMT = Individual and Family Self-Management Theory. PHQ = Personal Health Questionnaire. VNSSTRS = Visual Numeric Scale Stress. MMAS-4 = Morisky Medication Adherence Scale: 4-Item. VNSQOL = Visual Numeric Scale Quality of Life

Study measures, reflected in Table 3 above, include context, process, and outcomes variables, which are found in the current study. Descriptions of each of the measures follow.

Context variables

Age. Age was measured in years and was reported as age in whole years to protect the confidentiality of participants.

Sex. Sex was measured with choices of 0 = female or 1 = male.

Race. Race was measured with choices of 0 = White, 1 = Black/African American, and 2 = Other and was re-coded for the regression analysis as Race_=White Race, Racebldm= Black Race, and Raceotbm= Other Race.

Ethnicity. Ethnicity was measured as Hispanic/Latino 0 = no or 1= yes.

Marital status. Marital status was measured as, “Are you currently married, or living as married?” with 0 = no and 1 = yes.

Education level. Educational level was measured as a continuous variable from 1 to 23+ to indicate years of education from primary school, high school, and college/university, to graduate school. The participant questionnaire reflects numbers 1 through 23 as a continuous variable, which allows for the selection of the appropriate number of years of education completed.

Insurance type. Insurance (health insurance coverage) type included, none, Medicare, Medicaid (provided by government for low-income individuals), supplemental security income ([SSI] federal disability benefits), veterans’ benefits, private insurance (through employer or purchased), and other. All types of insurance were categorized as yes = 1 and none = 0.

Chronic health condition diagnosis. Chronic health condition diagnoses included (1) diabetes/high blood sugar, (2) asthma, (3) high blood pressure/hypertension, (4) heart disease,

(5) depression, and (6) anxiety or other emotional/mental health condition. The number of chronic conditions was totaled.

Literacy. This is a 1-item, 5-point Likert-type style scale (0 = *not at all*, 4 = *extremely*). It has a CI of 0.80 (0.67–0.93) for detecting inadequate literacy to 0.66 (0.57–0.76) for detecting inadequate to marginal literacy (Chew, Bradley, & Boyko, 2004). An item is, "How confident are you filling out medical forms by yourself?"

Personal Health Questionnaire (PHQ-8) for Depressive Symptoms. This is an 8-item, 4-point Likert- type scale (0 = *not at all* to 3 = *nearly every day*). This measure was adapted from the PHQ-9 by deleting Question 9 to avoid suicide topics (i.e., omitting the question, "How often during the past 2 weeks were you bothered by thoughts that you would be better off dead, or of hurting yourself in some way?"). Higher scores indicate greater numbers of depressive symptoms. A sample item is, "Were you bothered by feeling down, depressed, or hopeless?" The 9-item PHQ- 9 original study Cronbach's alpha was 0.9 in the PHQ Primary Care Study and 0.9 in the PHQ Ob-Gyn Study (Kroenke, Spitzer, & Williams, 2001). Cronbach's alpha reliability in the current study was 0.9.

Visual Analogue Scale (VAS) for Stress. This is a 1-item, 11-point scale with scores from 0 to 10 with a visual marked histogram corresponding to each number. The greater the number or height of the histogram, the greater the level of stress. A sample item is, "Please circle the number that describes your stress in the past week." When the VAS was compared to the Perceived Stress Scale (PSS), there was no difference in means scores (Lesage & Berjot, 2011). A VAS result of 7.0 was found to have "the best sensitivity/specificity ratio (0.74 and 0.93, respectively) for identifying those with high stress" (Lesage & Berjot, 2011, p. 434).

Process variable

The process dimension is associated with health behavior research and theories.

Communication with Physicians. This is a 3-item, Likert-type scale (0 = *never*, 5 = *always*) consists of three questions. It is used to determine if the key behaviors taught in the CDSMP involving communicating with physicians have changed (Lorig, Stewart, Ritter, González, Laurent, & Lynch, 1996). Higher scores indicate greater social facilitation capabilities. This instrument was originally created for the CDSMP National Study and includes three questions. All three questions were used as a total score for this process variable. The questions are as follows:

1. When you visit your doctor, how often do you do the following:
    a. Prepare a list of questions for your doctor?
    b. Ask questions about the things you want to know and things you do not understand about your treatment; and,
    c. Discuss any personal problems that may be related to your illness?

Cronbach's alpha reliability in the current sample was 0.8.

Outcome Variables

Proximal and distal outcome variables.

Medication self-management behaviors. The Morisky Medication Adherence Scale-Four (MMAS-4) Item was used to measure self-reported MSMB behaviors. This is a 4-item yes/no scale measures problems with medication self-management behaviors. To achieve a high score, a participant must answer yes to three out of four or four questions. The higher score indicates few or no problems with MSMB. Whereas, lower scores indicate the participant has problems with their MSMB.

The MMAS-4 measurement tool is constructed with questions that ask about the participant's carelessness and forgetfulness with regard to their MSMB (Morisky et al., 1986). The original 5-item MMAS was revised to 4 items to eliminate the patient tendency toward positive answers (Morisky et al., 1983). Furthermore, the four-item MMAS provides a composite MSMB measure, which is reflective of the sum of yes answers, which measures problems with MSMB. Responses to the questionnaire are yes and no, which, as indicated above, include a degree of bias toward positive answers. The scale scoring ranges from 0 to 4 (i.e., problems with MSMB to few to no problems with MSMB), with a Cronbach's alpha at 0.6 (Morisky et al., 1983). Cronbach's alpha reliability in the current study sample was 0.6.

Quality of Life Visual Analogue Scale. This is a 1-item, 11-point Likert-type scale (0 = *very poor quality*, 10=*excellent quality*). The participants answered one question, which read, "How would you rate your overall quality of life?" and were instructed to circle the number that best described their quality of life in the past week (CDSMP, 2010). According to the World Health Organization, quality of life is defined as an individuals' perception of their station in life in regard to the values system, culture in which they live and relative to their personal goals, expectations, ideals and concerns. Moreover, the WHO suggested quality of life is an expansive concept that is affected by the complexity of the individual's physical and psychological health, beliefs, interpersonal relationships and their environment.

Data Collection Procedure

In the current study, the data included original study data that were collected at baseline, 6 months, and 12 months. Data were provided as part of an agreement between Stanford University and the University of Wisconsin. This study represents a secondary data analysis that required screening the data.

Data Analysis

Descriptive Statistics

The purpose of this analysis was to summarize, and present results of the descriptive statistics used to describe the sample. Therefore, descriptive statistics of mean and standard deviation was calculated for the continuous variables, and frequencies and percentages were calculated for the categorical variables

Preliminary Analysis

The purpose of the preliminary analysis was to review the data in preparation for further analysis, identify missing data and determine methods of handling missing data (e.g., listwise deletion, pairwise deletion, imputation procedures, etc.), determine if the sample was sufficient for final analysis, and summarize the results. A preliminary analysis of context, process, and outcome variables was conducted from baseline to six-months and baseline to 12-months, after completion of the CDSMP intervention.

Missing Data Analysis

After the sample was defined based upon presence of the outcome variables, the predictor variables were reviewed to determine the presence of missing data. The missing data analysis included the following steps:

A. Determining if data were Missing at Random (MAR) data or Missing Completely at Random (MCAR) data. Little's MCAR test was used for this test.

B. As appropriate, methods for handling missing data was applied (e.g., listwise deletion, pairwise deletion, imputation procedures, etc.).

C. Due to the large sample size, if a predictor variable was only missing data from a few participants (e.g., less than 10 participants), no imputation was performed.

Repeated Measures Analysis of Variance (ANOVA)

The purpose of the repeated measures ANOVA was to analyze potential differences between data measured at baseline, six-months, and 12-months. Any predictor variable that did not statistically differ was adjusted for the baseline measure in the hierarchical regression analyses for the outcome variables. Any variable that did statistically differ had a post-hoc paired t-test analyses conducted to analyze potential differences between data measured at baseline to six-months, six-months to 12-months, and baseline to 12-months.

Correlation Analysis

Decision rules used to select the most salient predictors of the dependent variables for the primary analysis included: 1) predictor variables at any time point that were significantly related to the baseline, 6-month and 12-month outcome variables, and; 2) a predictor variable, such as a chronic disease with a known complex prescription regimen, that had clinical significance to a particular outcome variable (e.g., medication self-management behaviors). Predictor variables with significant correlation and those with clinical significance to an outcome variable were selected for the primary analyses of the research questions.

Regression Analysis

Variables considered for regression analysis included those with correlations significant at or above the 0.01 level. The cutoff for selection of predictor variables included those with a Pearson correlation that was significant at the 0.01 level and above with a $r \geq 0.2$. Correlations between one categorical variable and one continuous variable (a point-biserial correlation) were reported as significant at the 0.01 level and above with a $r \geq 0.2$. For research questions 1 through 4, after the variables for the inclusion were detected, the research questions were addressed as follows:

Research Questions

1. What context variables (individual/family perception of condition, health care access, culture, individual factors, developmental stages, learning ability, literacy, family structure and functioning, and capacity to self-manage) are associated with the proximal outcome of use of medication self-management behaviors at baseline, and at 6 months and 12 months after the CDSMP intervention?
2. What context variables (individual/family perception of condition, health care access, culture, individual factors, developmental stages, learning ability, literacy, family structure and functioning, and capacity to self-manage) are associated with the distal outcome of quality of life at baseline, and at 6 months and 12 months after the CDSMP intervention?
3. Is the process variable of communication with physicians (social facilitation: DOC-1, DOC-2, and DOC-3) associated with the proximal outcome of medication self-management behaviors at baseline, and at 6 months and 12 months after the CDSMP intervention?
4. Is the process variable of communication with physicians (social facilitation: DOC-1; DOC-2; DOC-3) associated with the distal outcome of quality of life at baseline, and at 6 months and 12 months after the CDSMP intervention?

   For research question number five, linear and hierarchical regression analyses were conducted to identify the best predictor variables for each outcome.
5. What combination of baseline, 6- month, 12- month context and process variables best predict medication self-management behaviors and quality of life?

Linear regression analyses were used to predict baseline medication self-management behaviors and baseline quality of life outcome variables. Hierarchical regression was used to predict six-month and 12-month medication self-management behaviors, and six-month and 12-month quality of life outcome variables. Prior to calculating hierarchical multiple regression, the relevant assumptions of this statistical analyses were tested. A sample size of 616 was deemed adequate given the number of potential predictor variables to be included in the analysis. Residual and scatter plots specified the assumptions of normality, linearity and homoscedacity were all satisfied. A three stage, complex hierarchical multiple regression calculation was conducted in two phases with medication self-management and quality of life, to identify the most relevant predictors of these outcome variables. First, predictor variables with a significant correlation ($p \leq 0.01$) with a criterion variable that also met the correlation level cutoff of ≥ 0.2 were added into the primary equation. Second, predictor variables with significant clinical implications on an outcome variable were added to the secondary equation. Where there were variables with a significant correlation ($p \leq 0.01$) with an outcome variable that did not meet the correlation cutoff, they were not added to the equation.

Human Subjects Protection

In the current study, which is a secondary dataset analysis of the Stanford University CDSMP, a de-identified data set was used. The data were obtained directly from Stanford University. A data use agreement is in place between Stanford University and the University of Wisconsin, Milwaukee for the current study. The University of Wisconsin Institutional Review Board (IRB) determined UWM was not engaged in human subject research. Therefore, submission of the current study to an IRB application to UWM was not required.

Limitations

Secondary analyses have the typical limitation of only allowing selection of data previously collected, which limits choices of variables. Thus, the researcher must settle on available variables previously collected, rather than a possible more preferred variable or more preferred phrasing of a variable. Another limitation is that 30% of the sample was dropped due to missing data and although imputation was not conducted due to having enough of a sample for the study, we do not know how the 30% compared to the 60%. The high educational level (mean is college) doesn’t match national statistics much less average age 60s with chronic disease and diversity, which may reflect the lack of cultural and social economic diversity among the sample. These limitations may limit the ability to interpret, apply and generalize the findings across diverse populations. Therefore, additional research is needed in MSMB that includes more culturally diverse populations and a broader age range of participants. Despite the number of limitations, this secondary analysis was a worthy endeavor with a large sample across the U.S. and it serves a starting place in MSM for this researcher.

Chapter Summary

Chapter 3 described the study design and sample studied. An overview was provided about the original sample and intervention purpose of the project from which data were obtained for this secondary data set analysis. The study instrument containing the variables that were studied was described. The statistical data analytical approach was provided along with the assumptions made when deciding upon the analytical approach. Potential ethical concerns and study limitations regarding this research study were addressed.

Chapter 4 reflects the results of the study design and analyses that was outlined in Chapter 3. The results in Chapter 4 reflect the findings in the preliminary analysis, missing data analysis, correlation analysis, and regression analysis. It culminates in setting the stage for the discussion in Chapter 5, which draws upon the introduction to the current study and subsequent critical review of the literature, which is reflected in the previous chapters, chapter one and chapter two.

CHAPTER 4

RESULTS

Results of the current study are provided in this chapter. Preliminary analysis was conducted to determine the degree of association among independent and outcome variables. Independent variables meeting criteria were further analyzed. Linear and hierarchical regression analyses were conducted to determine variables that predicted outcome variables at each measurement point. Predictors with the strongest beta weights were identified for each outcome variable. This chapter concludes with a summary of findings.

Preliminary Analyses

Analyses were conducted to determine the degree of association among the chronic disease and medication self-management constructs within and across methods (as assessed at baseline, 6, and 12 months). There were a small number (n = 64) of participants for whom data were missing for some of the predictor variables. Little's MCAR test was not statistically significant (p = 0.14) and indicated that the data were missing completely at random. Depressive symptoms and MSMB at baseline, 6 months, and 12 months had skewed distributions. Because there were some participants with values of 0, which would preclude a logarithmic transformation, all participants had the value of 1 added and then the variables were transformed logarithmically. The logarithmically transformed variables did not have a skewed distribution.

Table 4 shows the descriptive statistics. Mean number of chronic health conditions was almost 2 with a range of 0-6. Mean baseline, 6-month, and 12-month stress levels were all below the midpoint toward no stress. Mean depressive symptom scores at baseline, 6 months, and 12 months were all below the midpoint and were between not at all and several days.

Table 4. *Contrast of Baseline, Six-month and 12-month Predictor Variables, n =616.*

	Baseline		Six-months		12-months			95% *Cl*	
Variable	*M*	*SD*	*M*	*SD*	*M*	SD	*p*	*LL*	*UL*
Chronic Disease	1.7	1.20	N/A	N/A	N/A	N/A	.000	1.63	1.82
Literacy	9.6	2.68	N/A	N/A	N/A	N/A	.000	9.40	9.82
Stress	4.1	2.99	4.1	2.94	3.9	2.85	.000	3.83	4.30
Depressive Symptoms	6.2	5.30	5.5	5.02	5.1	5.08	.000	5.30	6.04
Physician Communication	8.7	3.86	9.3	4.01	9.4	3.97	.000	8.81	9.43
Quality of Life	6.7	2.08	6.9	1.95	7.0	1.98	.000	6.70	7.02

Mean physician communication scores at baseline, 6 months, and 12 months were at the level of fairly often. Mean baseline, 6-month, and 12-month MSMB scores were below the midpoint toward lower levels of SM. Mean baseline, 6-month, and 12-month QOL scores were all above the midpoint toward higher levels of QOL (Table 4).

Table 5 shows the repeated measures ANOVA for variables measured at baseline, 6 months, and 12 months. Analyses for stress revealed that mean stress did not significantly differ over time. Mean depressive symptoms, as measured by the PHQ, significantly differed over time. Post-hoc paired *t*-test comparisons showed that baseline was significantly greater than 6 months, 6 months was significantly greater than 12 months, and baseline was significantly greater than 12 months. Mean physician communication significantly differed over time. Post-hoc paired *t*-test comparisons showed that baseline was less than 6 months, and baseline was significantly less than 12 months. Mean MSMB significantly differed over time. Post-hoc paired *t*-test comparisons showed that baseline was significantly greater than 6 months, 6 months was significantly greater than 12 months, and baseline was significantly greater than 12 months (Table 5).

Table 5. *Repeated Measures ANOVA for Variables Measured at Baseline, 6 Months, and 12 Months, n = 616*

	Baseline	6 Months	12 Months	Wilk's lambda	
Variable	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*p* value	Post hoc
Stress	4.1 (2.99)	4.1 (2.95)	4.0 (2.85)	0.22	---
Depressive Symptoms	6.3 (5.31)	5.5 (5.04)	5.2 (5.09)	<0.001	Baseline > 6 months 6 months >12 months Baseline > 12 months
Physician Communication	8.7 (3.84)	9.2 (4.01)	9.4 (3.98)	<0.001	Baseline < 6 months Baseline < 12 months
Medication SM Behaviors	0.94 (1.10)	0.85 (1.08)	0.77 (1.06)	<0.001	Baseline > 6 months 6 months > 12 months Baseline > 12 months
Quality of life	6.7 (2.08)	6.9 (1.95)	6.9 (1.98)	0.001	Baseline < 6 months Baseline < 12 months

Note. SM = self-management. PHQ = Patient Health Questionnaire.

Mean QOL significantly differed over time. Post-hoc paired *t*-test comparisons showed that baseline was significantly less than 6 months, and baseline was significantly less than 12 months (Table 5).

Tables 6A, 6B and 6C show Pearson's correlation analyses for two continuous variables and point-biserial correlations for one continuous variable and one categorical variable. Variables were selected for inclusion in the primary analysis if they were statistically significant with a minimum correlation of 0.2 with the outcome variables of MSMB or QOL. Regarding baseline MSMB, there was a statistically significant negative correlation for age (r = **-**.30). There were statistically significant positive correlations for baseline MSMB and baseline stress (r = .20) and baseline depressive symptoms (r = .30). There were statistically significant negative correlations for 6-month MSMB and age (r = **-**.25) and insurance (r = **-**.20); and statistically significant positive correlations for 6-month MSMB and baseline stress (r = .22**)**, 6-month stress (r = .20), baseline depressive symptoms (r = .30), and 6-month depressive symptoms (r = .30) (Table 6A, 6B, 6C).

Table 6A. *Correlation Matrix for all Variables at Baseline*

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Baseline MSMB	1.00													
2. Baseline QOL	-0.17***	1.00												
3. Age	-0.26***	0.24***	1.00											
4. Sex	-0.04	0.03	-0.06	1.00										
5. Race	0.10*	0.05	0.03	---	1.00									
6. Hispanic Ethnicity	0.03	-0.08*	-0.18***	0.01	---	1.00								
7. Education	0.05	0.08	-0.11**	0.08	-0.03	-0.03	1.00							
8. Married	0.01	0.03	-0.07	---	---	---	0.09*	1.00						
9. Insurance	-0.13**	0.06	0.30**	---	---	---	0.04	---	1.00					
10. Disease	0.14**	-0.33***	-0.13**	-0.02	0.01	0.07	-0.11**	-0.10*	-0.07	1.00				
11. Literacy	-0.04	0.17***	-0.10*	-0.10*	-0.09*	-0.05	0.34***	0.08*	0.02	-0.04	1.00			
12. Baseline Stress	0.19***	-0.47***	-0.33***	-0.08	-0.06	0.10*	0.09*	0.05	-0.13**	0.28***	0.03	1.00		
13. Baseline Dep. Sx	0.27***	-0.59***	-0.32***	-0.03	-0.09*	0.11	-0.06	-0.01	-0.20***	0.39***	-0.12**	0.57***	1.00	
14. Baseline Communication with Physicians	-0.07	0.03	-0.04	-0.02	-0.08	-0.04	0.19***	0.08	-0.003	0.02	0.23***	0.11**	0.04	1.00

Note. MSMB = medication self-management behaviors. QOL = quality of life. Sx = symptoms. Dep. = depressive.
* = $p < 0.05$. ** = $p < 0.01$. *** $p < 0.001$.

Table 6B. *Correlation Matrix for all Variables at Six-Months*

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. 6-month MSMB	1.00													
2. 6-month QOL	-0.11***	1.00												
3. Age	-0.25***	0.16***	1.00											
4. Sex	0.01	0.01	-0.06	1.00										
5. Race	0.15***	-0.01	0.03	---	1.00									
6. Hispanic Ethnicity	0.05	-0.06	-0.18***	0.01	---	1.00								
7. Education	0.05	0.11**	-0.11**	0.08	-0.03	-0.03	1.00							
8. Married	0.03	0.07	-0.07	---	---	---	0.09*	1.00						
9. Insurance	-0.12**	0.03	0.30**	---	---	---	0.04	---	1.00					
10. Disease	0.12**	-0.23***	-0.13**	-0.02	0.01	0.07	-0.11**	-0.10*	-0.07	1.00				
11. Literacy	-0.07	0.15***	-0.10*	-0.10*	-0.09*	-0.05	0.34***	0.08*	0.02	-0.04	1.00			
12. 6-month Stress	0.20***	-0.29***	-0.24***	-0.09*	0.01	0.06	0.07	0.02	-0.05	0.23***	-0.004	1.00		
13. 6-month Dep. Sx	0.29***	-0.49***	-0.28***	0.01	-0.05	0.09	-0.05	-0.03	-0.15***	0.31***	-0.16***	0.53***	1.00	
14. 6-month Communication with Physicians	-0.01	0.06	-0.07	-0.06	-0.08*	0.02	0.15***	0.08	-0.01	0.02	0.22***	0.06	-0.01	1.00

Note. MSMB = medication self-management behaviors. QOL = quality of life. Sx = symptoms. Dep. = depressive.
* = $p < 0.05$. ** = $p < 0.01$. *** $p < 0.001$.

Table 6C. *Correlation Matrix for all Variables at 12-Months*

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. 12-month MSMB	1.00													
2. 12-month QOL	-0.16***	1.00												
3. Age	-0.20***	0.16***	1.00											
4. Sex	0.02	0.02	-0.06	1.00										
5. Race	0.23***	0.02	0.03	---	1.00									
6. Hispanic Ethnicity	0.04	-0.06	-0.18***	0.01	---	1.00								
7. Education	0.03	0.10*	-0.11**	0.08	-0.03	-0.03	1.00							
8. Married	-0.001	0.03	-0.07	---	---	---	0.09*	1.00						
9. Insurance	-0.09*	0.03	0.30**	---	---	---	0.04	---	1.00					
10. Disease	0.08	-0.27***	-0.13**	-0.02	0.01	0.07	-0.11**	-0.10*	-0.07	1.00				
11. Literacy	-0.06	0.14***	-0.10*	-0.10*	-0.09*	-0.05	0.34***	0.08*	0.02	-0.04	1.00			
12. 12-month Stress	0.18***	-0.34***	-0.25***	-0.04	-0.05	-0.04	0.04	0.06	-0.07	0.22**	0.05	1.00		
13. 12-month Dep. Sx	0.26***	-0.58***	-0.24***	-0.05	-0.08	0.07	-0.05	-0.09*	-0.15***	0.33***	-0.13**	0.50***	1.00	
14. 12-month Communication with Physicians	-0.07	0.03	0.003	-0.04	-0.08	-0.02	0.14***	0.07	-0.05	-0.03	0.19***	0.06	0.01	1.00

Note. MSMB = medication self-management behaviors. QOL = quality of life. Sx = symptoms. Dep. = depressive.
* = $p < 0.05$. ** = $p < 0.01$. *** $p < 0.001$.

As see in Tables 6A, 6B and 6C, there was a statistically significant negative correlation for 12-month MSMB and age (*r* =-.20); and a statistically significant positive correlation for 12-month MSMB and race (*r* = .23), baseline stress (*r* = .20), 6-month stress (*r* = .20), 12-month stress (*r* = .21); and baseline depressive symptoms (*r* = .23), 6-month depressive symptoms (*r* = .25), and 12-month depressive symptoms (*r* = .30).

There were statistically significant positive correlations for quality of life and age at baseline (*r* = .24), 6-months (*r* = .20), and 12-months (*r* = .20); and statistically significant positive correlations for quality of life and literacy at baseline (*r* = .20) and 6-months (*r* = .20). There were statistically significant negative correlations between quality of life and disease at baseline (*r* = -.33), 6-months (*r* = -.23), and 12-months (*r* = -.30); stress at baseline (*r* = -.50), 6-months (*r* = -.30), and 12-months (*r* = -.34); and depressive symptoms at baseline (*r* = -.60), 6-months (*r* = -.50), and 12-months (*r* = -.60). Based on these correlation analyses, predictor variables for inclusion in the primary analyses for each research question were as follows:

1. Age, sex, race, education, insurance, disease, and literacy were only measured at baseline and were added into the primary analyses for all research questions.
2. Stress, depressive symptoms, and communication with physicians were measured at baseline, six-months, and 12-months and were added to the primary analyses for all research questions.

Primary Analyses for Research Questions

Linear regression was used for prediction at baseline and hierarchical regression was used to predict six-month and 12-month medication self-management behaviors, and six-month and 12-month quality of life. Prior to calculating hierarchical multiple regression, the relevant assumptions of these statistical analyses were tested. Residual and scatter plots specifying the assumptions of normality, linearity and homoscedacity were all satisfied.

Firstly, linear regression analyses were conducted for independent variables that correlated with the dependent variables as described above. Secondly, a three- stage hierarchical multiple regression calculation was conducted in two phases with medication self-management behaviors and quality of life as the outcome variables. The predictor variables measured at baseline were entered at stage one, predictor variables measured at 6-months were entered into the regression model at stage two, and predictor variables measured at 12- months were entered at stage three. The hierarchical regression analysis for the outcome variable, medication self-management behaviors, was conducted using the following variables: (1) block one: baseline measurement point: age, race, insurance, baseline stress, and baseline depressive symptoms; (2) block two: six-month measurement point: six-month stress, and six-month depressive symptoms; and (3) block three: 12-month measurement point: 12-month stress, and 12-month depressive symptoms. The hierarchical regression analysis for the outcome variable, quality of life, was conducted using the following predictor variables at (1) block one: baseline measurement point: disease, age, literacy, baseline stress, and baseline depressive symptoms; (2) block two: six- month measurement point: six-month stress, and six-month depressive symptoms; and (3) block three: 12-month measurement point: 12-month stress, and 12-month depressive symptoms.

Research Questions (RQ)

Linear and hierarchical regression analyses was calculated for each research question and reflected below at each measurement point, baseline, six months, and 12-months.

RQ.1. What context variables are associated with MSMB at baseline, six-months and 12-months?

Discussion

Linear regression analysis was used to test the variables that predicted medication self-management behaviors at baseline. The results of the linear regression (Table 7) indicated four predictors in block one explained 14% of the variance in MSMB. It was found that age significantly predicted baseline medication self-management behaviors (ß=-.02) such that older individuals had lower scores in MSMB, as did baseline race (Black/African American) (ß=.08), race (Other) (ß=.12), and baseline depressive symptoms (ß=.24) such that race and depressive symptoms predicted lower MSMB (Table 7). Hierarchical regression analysis was used to test the variables that predicted MSMB at six-months (Table 7). The results of the six-month regression indicated four predictors in block one explained 14% of the variance. It was found that age significantly predicted six-month medication self-management behaviors (ß=-.15) such that older individuals had lower scores in MSMB, as did six-month Race (Black/African American) (ß=.15), race (other) (ß=.14), and baseline depressive symptoms (ß=.20) such that race and baseline depressive symptoms predicted lower MSMB. Results of the six-month regression indicated four predictors in block two explained 16% of the variance.

It was found that age significantly predicted six-month medication self-management behaviors (ß=-.13), as did race (Black/African American) (ß=.16), race (other) (ß=.12), and six-month depressive symptoms (ß=.16) such that race and six-month depressive symptoms predicted lower MSMB (Table 7). Additionally, hierarchical regression analysis was used to test the t variables that significantly predicted medication self-management behaviors at 12-months. The results of the 12-month regression indicated four predictors in block one explained 16% of the variance. It was found that age significantly predicted 12-month medication self-management behaviors (ß=-.13), as did race (Black/African American) (ß=.18), race (other) (ß=.21), and baseline depressive symptoms (ß=.18) such that race, particularly Black/African

American and Other, and depressive symptoms predicted lower MSMB (Table 7). Results of the 12-month regression indicated four predictors in block two explained 17% of the variance.

Table 7. *Linear and Hierarchical Regression Analyses for Variables Predicting Medication Self-Management Behaviors at Baseline, Six-months, and 12-months after the CDSMP Intervention.*

Measurement Point		**B**	**t**	**SE**	**ß**	**R**	***R^2***	**Λ*R^2***
	Model/Variables							
(Linear)								
	Block 1							
	Age	-.02	-4.5***	.004	-.19			
	Race (Black)	.25	2.1*	.12	.08			
	Race (Other)	.51	3.1**	.16	.12			
	Baseline Dep. Sx	.05	5.0***	.01	.24			
						.37	.14	.13
R^2=.14, F(6,601)=16.3, p<0.001								
		B	**t**	**SE**	**ß**	**R**	***R^2***	**Λ*R^2***
Six-Month (Hierarchical)	**Block 1**							
	Age	-.01	-3.5***	.004	-.15			
	Race (Black/AA)	.42	3.7***	.11	.15			
	Race (Other)	.56	3.5***	.16	.14			
	Baseline Dep. Sx	.04	4.2***	.01	.20			
						.38	.14	.13
R^2=.14, F(6,601)=16.5, p<0.001								
	Block 2							
	Age	-.01	-3.1**	.004	-.13			
	Race (Black/AA)	.45	4.0***	.11	.16			
	Race (Other)	.50	3.1**	.16	.12			
	6-month Dep. Sx	.04	3.0**	.01	.16			
						.40	.16	.15
R^2=.16, F(8,599)=14.1, p<0.001								
		B	**t**	**SE**	**ß**	**R**	***R^2***	**Λ*R^2***
12-Month (Hierarchical)	**Block 1**							
	Age	-.01	-3.0**	.004	-.13			
	Race (Black/AA)	.52	4.7***	.11	.18			
	Race (Other)	.89	5.6***	.16	.21			
	Baseline Dep. Sx	.04	3.9***	.01	.18	.40	.16	.15
R^2=.16, F(6,596)=18.6, p<0.001								
	Block 2							
	Age	-.01	-2.6**	.004	-.11			
	Race (Black/AA)	.54	4.9***	.11	.19			
	Race (Other)	.83	5.2***	.20	.20			
	6-Month Dep. Sx	.03	2.5*	.01	.13			
R^2=.17, F(8,594)=15.1, p<0.001						.41	.17	.16
	Block 3							
	Age	-.01	-2.8**	.004	-.12			
	Race (Black/AA)	.53	4.8***	.11	.19			
	Race (Other)	.88	5.5***	.16	.21			
	12-Month Dep. Sx	.05	4.0***	.01	.24			
R^2=.19, F(10,592)=14.2, p<0.001						.44	.19	.18

Note. *B* = binomial distribution. *ß* = beta. *SE* = standard error. *R* = regression. *t* = t distribution.
*= *p* <0.05. ** = *p* <0.01. *** = *p* <0.001. AA = African American. Dep = Depressive. Sx = Symptoms.

It was found that age significantly predicted 12-month medication self-management behaviors (ß=-.11), as did race (Black/African American) (ß=.19), race (Other) (ß=.20), and six-month depressive symptoms (ß=.13) such that race and depressive symptoms predicted lower MSMB. The results of the 12-month regression indicated four predictors in block three explained 19% of the variance (Table 7). It was found that age significantly predicted 12-month medication self-management behaviors (ß=-.12), as did race (Black/African American) (ß=.19), race (other) (ß=.21), and 12-month depressive symptoms (ß=.24) such that race and depressive symptoms predicted lower MSMB.

RQ.2. What context variables are associated with QOL at baseline, six-months and 12-months?

Table 8. *Linear and Hierarchical Regression Analyses for Variables Predicting Quality of Life at Baseline, Six-months, and 12-months after the CDSMP Intervention.*

Measurement Point	**Model/Variables**	**B**	**t**	**SE**	**ß**	**R**	***R*^{2}**	**Λ*R*^{2}**
Baseline (Linear)								
	Block 1							
	Race (Black/AA)	.40	2.2*	.18	.07			
	Disease	-.18	-3.1**	.06	-.11			
	Literacy	.08	3.1**	.03	.10			
	Baseline Stress	-.12	-4.3***	.03	-.17			
	Baseline Dep. Sx	-.17	-10.1***	.02	-.43			
R^2=.41, F(6,599)=69.4, p<0.001						.64	.41	.40
Six-Month (Hierarchical)		**B**	**t**	**SE**	**ß**	**R**	**R2**	**ΛR2**
	Block 1							
	Literacy	.07	2.6**	.03	.10			
	Baseline Dep. Sx	-.12	-6.4***	.02	-.31			
R^2=.19, F(5,602)=28.7, p<0.001						.44	.19	.19
	Block 2							
	6-month Dep. Sx	-.17	-8.9***	.02	-.44			
R^2=.30, F(7,600)=36.1, p<0.001						.54	.30	.29
12-Month (Hierarchical)		**B**	**t**	**SE**	**ß**	**R**	**R2**	**ΛR2**
	Block 1							
	Baseline Dep. Sx	-.18	-10.4***	.02	-.47			
R^2=.27, F(4,600)=55.1, p<0.001						.52	.27	.27
	Block 2							
	Baseline Dep. Sx	-.12	-6.3***	.02	-.32			
	6-month Dep. Sx	-.11	-5.9***	.02	-.29			
R^2=.31, F(6,598)=45.0, p<0.001						.56	.31	.30
	Block 3							
	Baseline Dep. Sx	-.05	-2.8**	.02	-.14			
	6-month Dep. Sx	-.06	-2.9**	.02	-.14			
	12-month Dep. Sx	-.16	-8.2***	.02	-.41			
R^2=.40, F(8,596)=49.4, p<0.001						.63	.40	.39

Note. *B* = binomial distribution. *ß* = beta. *SE* = standard error. *R* = regression. *t* = t distribution. *= *p* <0.05. ** = *p* <0.01. *** = *p* <0.001. AA = African American. Dep = Depressive. Sx = Symptoms.

Linear regression analysis (Table 8) was used to test the variables that predicted quality of life at baseline. The results of the linear regression (Table 8) indicated five predictors in block one explained 41% of the variance in QOL. It was found that race (Black/African American) significantly predicted baseline quality of life (ß=.07), as did disease (ß=-.11), literacy (ß=.10), baseline stress (ß=-.17), and baseline depressive symptoms (ß=-.43) (Table 8). Hierarchical regression analysis was used to test the variables that significantly predicted quality of life at six-months. The results of the six-month regression indicated two predictors in block one explained 19% of the variance. It was found that literacy significantly predicted six-month quality of life (ß=-.10) as did baseline depressive symptoms (ß=-.31). The results of the six-month regression indicated one predictor in block two explained 30% of the variance (Table 8). It was found that six-month depressive symptoms significantly predicted six-month quality of life (ß=-.44).

Additionally, hierarchical regression analysis was used to test the variables that significantly predicted quality of life at 12-months (Table 8). The results of the regression indicated one predictor in block one explained 27% of the variance. It was found that baseline depressive symptoms significantly predicted 12-month quality of life (ß=-.47). The results of the 12-month regression indicated two predictors in block two explained 31% of the variance. It was found that baseline depressive symptoms (ß=-.32), and six-month depressive symptoms (ß=-.29) significantly predicted 12-month quality of life. The results of the 12-month regression indicated three predictors in block three explained 40% of the variance (Table 8). It was found that baseline depressive symptoms (ß=-.14), six-month depressive symptoms (ß=-.14), and 12-month depressive symptoms (ß=-.41) significantly predicted 12-month quality of life. At 12-months, in block one, baseline depressive symptoms accounted for 27% of the variance in quality of life. In block two, baseline and six-month depressive symptoms accounted for 31% of the variance in quality of life. In block three, baseline, six-month, and 12-month depressive symptoms accounted for 40% of the variance in quality of life (Table 8).

RQ.3. Was the process variable of communication with physicians associated with the proximal outcome of medication self-management behaviors at baseline, six-months, and 12-months after the CDSMP intervention?

The process variable of communication with physicians was not found to be associated with the proximal outcome, medication self-management behaviors, at baseline, six-months, or 12-months after the CDSMP intervention. Correlations between the communication with physicians process variable and medication self-management proximal outcome variable ranged from $r = 0.01$ and $r = 0.09$, which, based on established decisions rules (inclusion criteria included independent variables with an $r \geq 0.2$, did not meet criteria for further analyses (Table 8).

RQ.4. Was the process variable of communication with physicians associated with the distal outcome of quality of life at baseline, and at 6 months and 12 months after the CDSMP intervention?

The process variable of communication with physicians was not found to be associated with the distal outcome, quality of life, at baseline, six-months, or 12-months after the CDSMP intervention. Correlations between the communication with physicians process variable and quality of life distal outcome variable ranged from $r = -0.01$ and $r = -0.08$, which, based on established decisions rules (inclusion criteria included independent variables with an $r \geq 0.2$, did not meet criteria for further analyses (Table 6).

RQ.5. What combination of baseline, six-month, and 12-month context and process variables best predicted medication self-management behaviors and quality of life?

Baseline age, baseline race (Black/African American and Other) and 12-month depressive symptoms explained 19% of the variance and best predicted medication self-management behaviors. The best predictors of baseline medication self-management behaviors were race (Black/African American, ß=.08), race (other, ß=.12), age (ß=-.19), and baseline depressive symptoms (ß=.24). The best predictors of six-month medication self-management behaviors were race (Black/African American, ß=.16), race (other, ß=.12), age (ß=-.13), and six-month depressive symptoms (ß=.16). The best predictors of 12-month medication self-management behaviors were race (Black/African American, ß=.19), race (other, ß=.21), age (ß=-.12), and 12-month depressive symptoms (ß=.24) (Table 8).

Baseline, six-month, and 12-month depressive symptoms explained 40% of the variance and best predicted quality of life (Table 8). The best predictors of baseline quality of life were race (Black/African American, ß=.07), baseline disease (ß=-.12), baseline literacy (ß=.10), baseline stress (ß=-.17), and baseline depressive symptoms (ß=-.43). The best predictor of six-month quality of life was six-month depressive symptoms (ß=-.44). For 12-month quality of life, baseline (ß=-.14), 6-month (ß=-.14), and 12-month (ß=-.41) depressive symptoms were the best predictors (Table 8).

Chapter Summary

In this chapter, the results of the current study were provided. Preliminary analysis were conducted and show the association among independent and outcome variables. Independent variables that met inclusion criteria were further analyzed. Linear and hierarchical regression analyses were conducted and the predictors with the strongest beta weights were identified for each outcome variable.

Age, race, and baseline depressive symptoms accounted for 14% of the variance for MSMB at baseline. For 6-month MSBM, age, race, baseline and 6-month depressive symptoms were the best predictors. At the 12 month measurement point, age, race, baseline, six-month and 12-month depressive symptoms were the best predictors for MSMB. Race, chronic disease, literacy, baseline stress, and baseline depressive symptoms accounted for 41% of baseline QOL. For 6-month QOL, literacy, baseline and 6-month depressive symptoms were the best predictors. At the 12-month measurement point, baseline depressive symptoms, six- and 12-month depressive symptoms alone accounted for 27% to 40% of the variance for QOL across the three regression blocks. In Chapter 5, a review of the purpose of the present study is examined, in addition to the study results.

CHAPTER 5

DISCUSSION

The study results are discussed in this chapter and are organized by key findings, results related to outcome variables, medication self-management behaviors and quality of life, which is followed by a broader discussion, study limitations, implications, and the conclusion. The purpose of the present study was to examine medication self-management behaviors and quality of life longitudinally among participants in the CDSMP (2010) National Study, and to further understand variables that were the best predictors of each outcome.

Key Findings

1. Age, race, insurance, stress and depressive symptoms met criteria for further analysis of MSMB, whereas, age, race, disease, literacy, stress and depressive symptoms met criteria for further analysis of QOL.
2. For the proximal outcome, MSMB, age, race, and depressive symptoms were the best predictors at all measure points. Additionally, age and race were the only consistent predictors at each measurement point. Baseline, six-month, and 12-month depressive symptoms varied across each measurement point as predictors of MSMB. Moreover, baseline depressive symptoms predicted baseline, six-month, and 12-month MSMB as reflected in the block one regression analysis across measurement points.
3. Depressive symptoms was the best predictor of the distal outcome, quality of life, at the baseline, six- month, and 12-month measurement points. In addition, literacy was a consistent predictor of QOL at the baseline and six-month measurement points.
4. The process variable, physician communication, did not correlate with either outcome variable, MSMB or QOL, at any measurement point (baseline, six-months, or 12-months) after enrollment in the CDSMP, however, it did correlate with educational

level at the baseline and six- month measurement points, but did not meet inclusion criteria for further analysis.

Descriptive Findings

Context Variables

The sample consisted of mostly White/Caucasian, n=465, (Black/African American *n*= 104; other *n* =45; among which, 30 participants indicated they were of Hispanic ethnicity) women (n = 504) among 616 participants who had a mean age in years of 68. Sixty-one percent of the sample was not married, which may have been due, in part, to being widowed. The mean years of education completed was 14, which indicates the sample completed high school and some college. Participants responded to the literacy question, “How confident are you filling out medical forms by yourself,” with a mean of 3.2 out of 4, which indicated they were “quite a bit” confident with filling out medical forms (CDSMP, 2010).

The mean number of chronic health conditions among the participants was two (mean of 1.7), which is reflective of comorbidities with additional complexity that require extra effort by individuals and their families to coordinate specialty care and manage healthcare needs. The number of participants indicating they had health insurance was 586 or 84%, which suggests most of the sample had access to healthcare and were able to seek care and treatment of their chronic health conditions. Both stress and depressive symptoms improved over time. Stress reduced by nearly two points from baseline to 12-months after enrollment in the CDSMP workshop, which was closer to “no stress” (CDSMP, 2010).

Likewise, depressive symptoms dropped consistently across the sample from the baseline to the 12-month measurement points (from 6.2 to 5.1, respectively), reflecting a reduction in depressive symptoms to between several days in a week to not at all, contrasting with potential higher means of 6.3 to 24 that indicate depressive symptoms occur more than half the days in a week to nearly every day.

Process Variables

At baseline, the process variable, communication with physician, had a mean of 8.7, which suggested study participants prepared a list of questions for their doctors, asked their doctors questions about their treatment, and discussed personal problems with their doctors about their illness. The mean increased to 9.2 at the six-month measurement period and to 9.4 by 12-months after enrollment in the CDSMP workshop. The communication with physician mean improved from sometimes (mean of 6) and fairly often (mean of 9) to fairly often (mean of 9) and very often (mean of 12).

Outcome Variables

The proximal outcome variable, MSMB, reduced from a mean of 0.94 at baseline and a mean of 0.85 at six-months to a mean of 0.77 at 12-months. This reduction reflects improvement in MSMB from baseline to six-months and 12-months after enrollment in the CDSMP workshop. This improvement indicated study participants more frequently did not forget to take their medicine, did not have problems remembering to take their medicine, did not stop taking their medicines when they felt better, and continued taking their medication when they felt worse.

Quality of life (distal outcome) was analyzed at each measurement point in this study. Results reflected an increased mean from baseline to six-months and 12-months, which was 6.7, 6.9, and 7.0, respectively. Participants answered the question, “How would you rate your overall quality of life?” by selecting a number from 0 (poor quality) to 10 (excellent quality) on the QOL scale. The mean results across all measurement points ranged between a mean of 6.7 and a mean of 7.0 on the QOL scale, indicating QOL for the sample was above the midpoint and it improved to a mean of 7 at 12-months after enrollment in the CDSMP workshop. The mean of 7 on the QOL scale is three points down from excellent quality (mean of 10), which reflects overall improvement in QOL across the sample.

Preliminary Findings

Lower stress levels and lower depressive symptoms were each found to be associated with increases in medication self-management behaviors, but at higher levels, both stress and depressive symptoms were associated with decreased quality of life. Contrary to many studies, Black/African American race was found to be associated with increases in medication self- management behaviors, suggesting that the intervention may influence similar outcomes across races with respect to MSMB. Ory, Ahn, Jiang, Lorig, Ritter, Laurent, Whitelaw and Smith (2013), posited the CDSMP National Study reflected racial/ethnic diversity noting that nearly half of the participants were Black/African American, Hispanic/Latino, or representative of other minority groups. Strengths of the current study include longitudinal analysis of the variables, inclusion of the IFSMT construct to examine the clinical practice implications of the CDSMP and eliminating cases with missing outcome data.

Medication Self-Management Behaviors Findings

As anticipated from the literature, age, health insurance, race, and having at least one chronic disease were found to be associated with medication self-management behaviors at each measurement point. Overall, and similar to Gellad, Haas and Safran (2007), these findings suggest that older Americans lacking adequate health insurance coverage are at greater risk for poor health outcomes, due to having fixed incomes and the inability to pay out-of-pocket for their prescription medication. Moreover, in a study examining medication use among inner-city patients after hospitalization, Kripalani, Henderson, Jacobson, and Vaccarino (2008) cited cost of medication to be among the primary reason for patients not filling their medication prescriptions.

Study findings, according to Ory, Ahn, Jiang et al. (2013), indicated CDSMP successfully reached and retained diverse racial/ethnic populations, including approximately 80% female participants. However, with a predominately female population, generalizability of the study findings (Wilcox, Dowada, Griffin, Rheaume and Ory, 2006). It is worth restating that, according to Phillips (2005), "women appear to suffer more negative health consequences of inequalities between the sexes," which may be associated with gender being a social construct and human rights inequalities disproportionately affecting women (pg. 12). Further, with men having a higher mortality rate than women, despite men having advantages of social determinants, their life expectancy is significantly less than women's (Phillips, 2005).

As noted earlier, Hispanic ethnicity, educational level, marital status, and literacy were not found to have a significant association with MSMB at any of the measurement points. It is also worth noting that some of these findings differ from other studies, particularly, "functional social support has stronger effects" on medication self- management behaviors "than does social support," suggesting that presence of a social network alone does not matter (Ory, Ahn, Jiang et al., 2013, p. 212). Rather, relationship quality, such as the quality that may be found in spousal, parental, and relationships among children, have been found to have a greater influence on health outcomes, including increases in medication self-management behaviors (DiMatteo, 2004). Not surprisingly, Kripalani, Henderson, Chiu, Robertson, Kolm and Jacobson (2006) found that 47% of people with insufficient literacy skills could not state their medication times, and 54.3% could not describe how to take their medications, which reflects an association between literacy and medication self-management behaviors.

Having fewer than two chronic diseases was associated with MSMB at six-months after enrollment in the CDSMP and not significant for MSMB at 12- months, however, having more than two chronic diseases was negatively associated with quality of life outcomes at six-months and 12-months. In a study by Koch, Wakefield, and Wakefield (2014) in which barriers and facilitators to managing multiple chronic conditions were reviewed, it was found that patients diagnosed with multiple chronic diseases identified nine, separate categories of barriers to managing their health conditions, including financial, physical, emotional impact, inadequate family support, complexity of managing more than one health condition, communicating with providers, and medication self-management. Similarly, Zulman, Asch, Martins, Kerr, Hoffman, and Goldstein (2013) found that "Multimorbidity—the presence of multiple chronic conditions—is an increasingly recognized challenge to quality improvement and cost-containment efforts for healthcare systems;" further, "When patients have multiple health problems, it affects their quality of life and ability to work, and is associate with increased rates of functional decline and mortality" (p.529).

Communication with physician (process variable) significantly improved over time from baseline to 12-months following the CDSMP workshop. At baseline, the mean for communication with physician was 8.7. At six-months, the mean increased to 9.3, and, by 12-months, communication with physician increased to a mean of 9.4. These results reflect improvement in communication with physician toward very often on the measurement tool. The communication with physician variable did not correlate with either outcome, therefore, it did not meet inclusion criteria for further analysis, however, at the 12-month measurement point, the communication with physician variable correlated with both outcome variables with an *r* = 0.1, indicating some association between communication with physician, MSMB and QOL. Morisky, Green, and Levine (1986) suggested, "the provider and his or her style of communicating with the patient may alter the patient's ability and inclination to comply with medication use, however, although the provider-patient relationship is assumed to be important, little is known about the association with patient outcomes" (p. 68). Based on Lorig, Stewart, Ritter, Gonzalez, Laurent, and Lynch (1996), the "communication with physician" scale was a newly constructed tool, which was used to measure both self-management behaviors (frequency of preparing a list of questions, asking questions about things one doesn't know/understand, and discussing personal problems related to illness), and self-efficacy to perform self-management behaviors (confidence that one can ask doctor about things of concern, discuss openly any personal problems related to illness, and work out differences if any arise.

Quality of Life Findings

The mean baseline, six-month, and 12-month QOL findings were all above the midpoint toward higher levels of QOL, which significantly differed over the three measurement times. The post-hoc paired t-test comparisons showed that baseline QOL was less than six-months, and that baseline was less than 12-months. Thus, post-hoc t-test results revealed that the participants in the CDSMP National Study had prior quality of life levels that were already moderately high. As mentioned above, having more than two chronic diseases was associated with poor quality of life outcomes at six-months and 12-months, which reflects the difficulty associated with managing multiple chronic health conditions.

In the current study, stress did not significantly change over time, whereas, PHQ depressive symptoms did, particularly revealing that baseline PHQ depressive symptoms were greater than six-month and 12-month findings. Maybe the interaction and attention in the workshop sessions improved mood. However, stress and PHQ depressive symptoms were each found to be associated with decreased quality of life outcomes at six-months and 12- months. Similarly, in a CDSMP cohort reflecting higher PHQ depressive symptoms, Ritter, Ory, Laurent, and Lorig (2014) found that the PHQ depressive symptoms reduced significantly following the CDSMP intervention for many of the workshop participants.

Ritter et al. (2014) postulated, “it is possible for a generic program aimed at multiple chronic conditions to make a clinically significant impact on a least one symptom, depression, for those who entered the program with depression” (p. 405). Among CDSMP workshop participants, Smith, Cho, Salazar, and Ory (2013) found the greatest improvement for health-related quality of life to be among racial/ethnic minority participants, particularly among Hispanic non-White individuals, which, again, reflected promising short-term benefits of the CDSMP for racial/ethnic minorities.

Limitations

There were several limitations associated with this study. First, it was a secondary analyses of a previous study, which has inherent drawbacks, in particular, secondary data cannot be modified, and therefore, it may not neatly fit within the context of the new study. Any limitations of the first study persisted to the current study/secondary analysis. Second, the original CDSMP National Study lacked a control group, therefore, it is not certain if the improvements observed in the study were due to other factors. It is quite possible that improvement due to participating in the CDSMP workshop provided some benefit to participants, but perhaps just getting together and having snacks would have produced the same results—that’s what a control group would have demonstrated. Third, as found in other studies, participants were predominantly female, thus, generalizability is limited primarily to women with higher education levels and only two chronic diseases.

Depressive symptoms accounted for most of the variance in the distal outcome, quality of life, which calls to question its usefulness as a variable in the study. In addition, participants documenting an actual medical diagnosis of depression in the demographic questionnaire were included in the study. This may have skewed the quality of life outcome results due to the tendency of individuals with depression to express poorer quality of life as compared to their counterparts without a depression diagnosis. Furthermore, the lack of a control group, which is essential in determining if participants with depression show actual improvement, may have skewed improvement in depressive symptom results in the current study.

Use of the Morisky Medication Adherence Scale in the current study limited the reliability of the proximal outcome results for MSMB, due to the scales low Cronbach alpha=.61 (Morisky et al., 1996). According to Tan, Patel and Chang (2014), the MMAS-4 has moderate to high reliability in some studies, however, with its lack of validation across many chronic diseases and human populations, its reliability is limited. The MMAS-4 was used to measure self-reported MSMB behaviors. This is a 4-item yes/no scale measures problems with MSMB. To achieve a high score, a participant must answer yes to three out of four or four questions. The higher score indicates few or no problems with MSMB. Whereas, lower scores indicate the participant has problems with their MSMB. The MMAS-4 measurement tool is constructed with questions that ask about the participant’s carelessness and forgetfulness with regard to their MSMB (Morisky et al., 1986).

The original 5-item MMAS was revised to 4 items to eliminate the patient tendency toward positive answers (Morisky et al., 1983). Furthermore, the four-item MMAS provides a composite MSMB measure, which is reflective of the sum of yes answers, which measures problems with MSMB. Responses to the questionnaire are yes and no, which, as indicated above, include a degree of bias toward positive answers. The scale scoring ranges from 0 to 4, with a Cronbach’s alpha at 0.6 (Morisky et al., 1983). The Cronbach’s alpha reliability in the current study sample was 0.6, which, as indicated above, limits the scales reliability, which may indicate limitations in the MSMB outcome findings in the current study.

Another limitation was the communication with physician tool, which did not correlate with the outcome, medication self-management behaviors. Perhaps a communication measure that included communication across the inter-professional health care team and addressing discussing medication self-management behaviors with the health care team and/or primary care provider, would predict MSMB more successfully. Literacy is an important factor in the current study, however, it only marginally correlated with quality of life at baseline and six-months after enrollment in the CDSMP. The measure that was used for literacy lacks robustness, therefore, another tool for literacy is needed to reflect the relationship literacy has with important variables examined in this study. Finally, a significant limitation of the current study was the lack of measures to adequately examine self-efficacy among participants in the CDSMP national study.

The self-efficacy theory describes self-efficacy as the confidence in one's ability to engage in, perform, and master a task (Bandura, 2004). As discussed in the IFSMT, self-efficacy underpins successful engagement in self-management behaviors. In the current study, communication with physician was the only appropriate measure from the primary study that aligned with the IFSMT process dimension. Because the communication with physician measure lacked significant correlation with the outcome measures, MSMB and QOL, in the current study, the ability to adequately examine the effectiveness of the IFSMT relative to the self-management process among the community dwelling adult participants in the CDSMP national study was lacking. It is possible, however, that the other self-management measure from the primary study, physical activities, may have yielded better SM results.

Individual and Family Self-Management Theory

As discussed above, a proposition of the IFSMT is that successful management of chronic conditions and active engagement in healthy lifestyles is increasingly perceived as the responsibility of the individual, with support provided by his or her family.

IFSMT conceptualizes self-management as

> [b] process in which individuals and families use knowledge and beliefs, self-regulation skills and abilities, and social facilitation to achieve health-related outcomes. Self- management takes place in the context of risk and protective factors specific to a health condition, physical and social environment, and individual and family. Self-management is applicable to chronic conditions as well as health promotion. ("Self-Management," n.d., para. 1)

In a study by Verchota and Sawin (2016), in which the IFSMT was used to set the theoretical and conceptual framework, the researchers suggested "further research to investigate key variables and relationships within the IFSMT affected by depressive symptoms is needed to more fully understand how to optimize self-management behaviors" (p. 494). In the current study, it was found that further research is needed to investigate key variables and associations within the IFSMT affected by depressive symptoms and stress to more fully understand the best approaches to improve self-management behaviors.

In the current study, use of secondary data significantly limited the researcher's ability to fully understand the effect the self-management process had on the outcome variables, due to lack of an appropriate process variable. Communication with physician, which measured the participant's social facilitation, did not correlate with either of the outcome variables or meet criteria for further regression analysis. Therefore, further research is needed to identify a more suitable process variable to more fully understand the associations among context, process and outcomes variables and how to enhance medication self-management behaviors and quality of life.

Chronic Disease Self-Management Program

The findings in the current study may serve to provide important information about the CDSMP and participants in the CDSMP National Study. Additionally, the original CDSMP National Study lacked a control group, therefore, it is not certain if the improvements observed in the study were due to other factors. It is quite possible that improvement due to participating in the CDSMP workshop provided some benefit to participants, but perhaps just getting together and having snacks would have produced the same results—that's what a control group would have demonstrated. Further research of the CDSMP is needed to more fully understand its potential effectiveness across human populations, chronic health conditions, and healthcare settings. Moreover, inclusion of a control group in future CDSMP research would enhance the validity and generalizability of the study outcomes.

Implications

The implications of the current study and findings include use of the IFSMT as a framework to understand the effects of context and process variables on outcome variables. Using the IFSMT across clinical practice settings and for inter-professional approaches to patient care and treatment, may likely serve as an opportunity to increase collaboration across disciplines and enhance team-based patient care delivery. Additional implications of the current study include the application of the CDSMP as a tool upon which to build in capabilities for other populations, such as individuals who experience frequent exacerbations of their chronic health conditions (namely acute on chronic conditions) that primarily require emergency room care, and as a tool for other health conditions that are chronic in nature, such as sepsis, acute kidney injury, and orthopedic conditions that do not involve arthritis—rather causes significant physical debilitation.

Research

Future research is needed in the Black/African American and Other racial populations in regards to potential under-reporting of their medication self-management and quality of life outcomes. Further, additional research is needed on the factors associated with chronic disease complexity and relative implications on medication self-management behaviors.

Practice

Moreover, future research is needed to effectively measure the benefits of the CDSMP and the potential opportunities to expand the CDSMP across clinical practice settings and in diverse patient populations. In doing so, it would be important for future CDSMP research designs to include a control group to enhance study rigor, reliability, and generalizability.

Policy

The policy implications of the current research include potential medication underuse among low-income persons, and Medicare beneficiaries, due to rising prescription medication costs and Medicare limitations.

Education

Self-management education is important for individuals and families who are responsible for managing chronic health conditions. Education implications span individuals with chronic health conditions, their families, as well as health care professionals, such as, nurse practitioners, physicians, and nurses, among other clinical disciplines. Therefore, exploring the feasibility of embedding self-management education across clinician-based, academic programs would lend itself to expanding the reach of self-management education to patients and families.

Conclusion

As found in the current study, age, race, and baseline depressive symptoms accounted for 14% of the variance for MSMB at baseline. For 6-month MSBM, age, race, baseline and 6-month depressive symptoms were the best predictors. At the 12 month measurement point, age, race, baseline, six-month and 12-month depressive symptoms were the best predictors for MSMB. Race, chronic disease, literacy, baseline stress, and baseline depressive symptoms accounted for 41% of baseline QOL. For 6-month QOL, literacy, baseline and 6-month depressive symptoms were the best predictors. At the 12-month measurement point, baseline depressive symptoms, six- and 12-month depressive symptoms alone accounted for 27% to 40% of the variance for QOL across the three regression blocks.

Although the current study results suggested medication self-management behaviors and quality of life are related to key context variables, the same was not found with the process variable, communication with physicians. The inclusion of a depressive symptoms measure at baseline, six-months, and 12-months and subsequent inclusion of individuals with depressive symptoms into the primary study potentially altered the quality of life results. These findings contribute to our understanding of the associations among key context variables with the outcomes, medication self-management behaviors and quality of life.

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CURRICULUM VITAE

MICHELLE Y. WILLIAMS

A Registered Nurse Leader with direct experience defining, guiding Nursing Practice with an evidence-base for RNs, LVNs, CNAs, MAs, and other Allied Health Professionals across Private and Academic, Government, and Public healthcare organizations.

EDUCATION

PhD University of Wisconsin, Milwaukee
Doctor of Philosophy (PhD), Nursing Science
Dissertation: Medication Self-Management Behaviors in Adults with Chronic Disease

MSN Holy Names University, Oakland
Master of Science, Nursing Administration
Thesis: Nursing Leadership role in Technology Innovation

BSN Holy Names University, Oakland
Bachelor of Science, Nursing

HONORS AND AWARDS

Innovation and Advanced Technology 2007
$750,000 Innovation Grant Award Recipient
Patient Room of the Future; Single-Bedded NICU Innovations

The Advisory Board Company, Washington D.C. 2006
Leadership Fellowship: Certificate

Stanford University School of Medicine 2013
Master Trainer, Chronic Disease Self-Management Program

PROFESSIONAL ROLES

- **Administrative Nursing Supervisor, 2018 – Current**
  Alameda Health System: Highland General Hospital (Trauma Center)

- **Administrative Nursing Supervisor, 2019 – Current**
  Kaiser Permanente, Vallejo Medical Center

- **Assistant Professor, 2018 – Current**
  California State University, East Bay: College of Nursing

PROFESSIONAL EXPERIENCE

VA Northern California Healthcare System August 2015 – June 2019

- **Quality Nurse Consultant, 1/2019 – 6/2019**
  Responsible for Perioperative Services (moderate sedation, surgical workgroup, operative and invasive procedures), Commission on Accreditation of Rehabilitation Facilities (CARF) Programs, including the Advanced Low-Vision Clinic, Comprehensive Integrated Inpatient Rehabilitation Program (CIIRP), Provision of Care, Integrated Behavioral Health/Primary Care, Homeless Program (HUD/VASH), and Employment and Community Services Programs, The Joint Commission (TJC) survey process.

- **Director, Nursing Education Department, 10/2018 – 2/2019**
  Post-Baccalaureate Nurse Residency Program
  Transition to Practice Program
  Nursing Trainee Programs: BSN, NP MSN
  My role as Director, Nursing Education Services, includes oversight of funded VA nursing education programs, leading Commission on Collegiate Nursing Education (CCNE) accreditation process, 2018-2019, and leadership over the VA Learning Opportunities (VALOR) RN Residency, Post-Baccalaureate Residency, Transition-to-Practice, Preceptorship and Affiliation Agreements/Clinical Placement Programs.

- **Coordinator, Nursing Education Department, 8/2015 – 10/2019**
  Academic Affiliations, Clinical Placements
  BSN Trainee Program, NP MSN Trainee Program

Kaiser Permanente, June 1990 – Current

- **Administrative Nursing Supervisor, 2018 – Current**
  Kaiser Permanente Medical Center, Vallejo

- **Administrative Nursing Supervisor, 2017**
  Kaiser Permanente Medical Center, Santa Clara
  Responsible for administrative and clinical coverage, and throughput across the Hospital and Medical Center and managing Bed-Control, including admitting patients from the ED to Hospital Beds, accepting patients from Outside Services; and facilitating inter-facility transfers for level of care changes/needs.

- **Director, Quality and Education Departments, 2016 – 2017**
  Kaiser Permanente (Post-Acute Care Center), San Leandro
  Responsible for Quality and Performance Improvement, Risk Management, Infection Control, Patient Safety, Medication Safety, Employee Health, Regulation and Licensing, Compliance, and Education across all disciplines and departments.

- **Senior Regional Director, Health Plan Local Member Services, 2012 - 2014**
  Kaiser Permanente, Northern California Region
  Led Local Member Services across the Northern California Region at 21 Medical Centers; 242 Medical Office Buildings (Out-Patient Facilities); 4,154,748 Members, 20 Operations Directors/Direct Reports.

- **Director, Nursing Innovation, Program Office, 2007 – 2012**
  Kaiser Permanente, Program Offices
  Under direction of VP of National Patient Care Services/Nursing and Executive Director of Innovation & Advanced Technology: National IT Strategic Initiatives & Operations, responsible for providing leadership, direction, and strategic planning for research, piloting, and operational handoff of emerging health care technologies that improve clinical and nursing practice and patient care quality, safety, and satisfaction.

- **Director, Maternal Child Health, 2006 – 2007**
  Kaiser Permanente Medical Center, Oakland
  Responsible for day-to-day operations across Maternal Child Health Services across a 350-bed tertiary medical center with direct responsibility for 25-bed, acute Pediatric Unit, 16-bed PICU.

- **Chief Nurse Executive, 2004 – 2006**
  Kaiser Permanente Medical Center, Richmond
  Led patient care and nursing operations across Kaiser Richmond, a 50-bed medical center, and an in-patient and ambulatory surgery center. Managed a $30M budget and 300 nursing staff.

- **Director, Administrative Nursing Services & Nursing Quality, 2002 – 2005**
  Kaiser Permanente Medical Center, Los Angeles
  Responsible for operations across a 500-bed tertiary medical center across In-Patient and Ambulatory Nursing with responsibility for Bed Management, Nursing Staffing Office, and Nursing Administrative House Supervisors. Led Nursing Quality and deployment of Shared Governance for Nursing.

- **Nursing Administrative Supervisor, 1999 - 2002**
  Kaiser Permanente Medical Center, West Los Angeles

- **Registered Nurse, Level III Neonatal Intensive Care Unit, 1989 – 1997**
  Kaiser Permanente Medical Center, Oakland
  Cross-trained to In-Patient Pediatrics, PICU, High Risk Obstetrics, Post-Partum.

Teaching Experience

Nursing Assistant Professor, Adjunct
California State University, East Bay, Hayward/Concord, CA
August 2011 – Present
Courses Taught: Pre-licensure BSN, RN-to-BSN
NURS 422_05. EBP and Nursing Research Online Course, Spring 2019. RN-to-BSN
NURS 422_07. EBP and Nursing Research Online Course, Spring 2019. RN-to-BSN
NURS 423_01. Leadership in Nursing In-Person Course, Fall 2018. BSN
NURS 4203. EBP and Nursing Research Online Course, Winter 2011. RN-to-BSN

Nursing Assistant Professor, Adjunct
Samuel Merritt University, Oakland, CA
August 2015 – January 2016
Courses Taught: Doctor of Nursing Practice (DNP) Program
NURS 706. Advanced Informatics Online Course. Fall 2015.

Nursing Assistant Professor, Adjunct
California State University, Stanislaus, Stockton, CA
Fall 2015 – Spring 2016
Courses Taught: Second Degree, Pre-licensure BSN Program
NURS 3310. Nursing Leadership and Management In-Person Course. Fall 2015.

Nursing Assistant Professor, Director Simulation Center/Informatics
Holy Names University, Oakland, CA
Fall 2011 – Spring 2015
Courses Taught: Pre-licensure BSN Program, RN-BSN Program, MSN and FNP Program.
NURS 211. Theoretical Basis & Philosophical Foundation: APRNs. In-Person Course.
NURS 141. Nursing Research Synthesis. RN-BSN Program, In-Person Course.
NURS 217A. Scientific Inquiry. MSN Program, In-Person.
NURS 207B. Capstone Project. MSN Program, In-Person.
NURS 151. Nursing Leadership Theory. RN-BSN Program, In-Person.
NURS 151L. Nursing Leadership Lab. RN-BSN Program, In-Person.
NURS Pre-Licensure LVN-BSN Program. Independent Study Students.
NURS 215. Role Transition of the Graduate Nurse. MSN Program.
NURS 243. Advanced Pathophysiology. MSN/FNP Program, In-Person.
NURS 233. Data Management in Healthcare. MSN Program.
NURS 236. Health Information Technology. MSN Program.
NURS 237. Technology and Innovation. MSN Program.
NURS 239. Nursing Informatics Concepts and Practice. MSN Program.

Other Professional Positions

- **California Department of Public Health, Los Angeles, 2000-2002**
  Nurse Evaluator II: In-Home Operations Medi-Cal/Medicare CMS Waiver Program

- **Golden State Health Services, Sherman, Oaks, 1999 – 2000**
  Director, Nursing Services: Sub-Acute and Long-Term Care Facility

- **Telecare, Corporation: Gladman and Los Positas, Oakland/Camarillo, 1994 – 1999**
  Director, Nursing Services: Sub-Acute and Residential Mental Health Services

- **University of California, San Francisco: General Clinical Research Center, 1989-1992**
  Nurse Manager and Developer: Off Campus Clinical Trials Research Center, Chronic Disease/Urgent Care Clinics at Highland Hospital and Summit Medical Centers, Oakland

- **University of California, San Francisco, Children's Hospital Oakland, 1989-1990**
  Registered Nurse, Level IV Neonatal Intensive Care Nursery

- **Alameda Health System, Mental Health/ED Services, 1984-2001; 2018-current**
  Registered Nurse, Nurse Manager, Administrative Nursing Supervisor