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Quality of Life for Persons with Chronic Disease Utilizing Mobile Integrated Healthcare

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This is to certify that the doctoral dissertation by

John Robert Ash

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Walden University
2020

Abstract

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MHA, King's College, 1996

BS, King's College, 1994

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Health Services Administration

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Abstract

The use of mobile integrated healthcare-community paramedicine (MIH-CP) has the potential to be integrated into existing chronic disease management initiatives as a means of reducing unnecessary hospitalizations and costs as well as improving quality of life (QOL). The purpose of this study was to analyze the relationships between demographics, noncommunicable disease type (NCD), and changes in self-perceived, self-reported QOL for those who have participated in an MIH-CP program. The research design for this study was a pretest/posttest design using secondary data that were obtained from a research partner using the MIH-CP intervention and collecting QOL data using the Euroqol QOL survey (EQ-5D-3L) ($N = 645$). The health belief model was the theoretical foundation of this study. Multiple linear regressions results did not show statistically significant relationships among all of the independent variables (i.e., gender, NCD type, days in MIH, age, and hospital admission status) and the dependent variable of self-reported, perceived QOL. Paired sample *t* tests showed a statistically significant difference between the pretest and posttest scores of self-reported, perceived QOL ($p = .000$). The results of this study could be used to provide preliminary support for the use of the MIH-CP program. In addition, further investigation of the MIH-CP intervention as a tool for mitigating the human and financial costs associated with management of NCDs and QOL perceptions should be pursued. Positive social change implications include the possible reduction of expenditures for NCDs and human suffering as well as the possible improvement in QOL for those with NCDs.

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Dedication

I dedicate this dissertation to my wife, Patricia, and our children, Michelle, Christopher, and Matthew. Without their support, I could not have completed this special journey. I would also like to dedicate this achievement to my mother who passed away only ten short months after I began my doctoral education and to my father who is battling Alzheimer's disease. Mom and Dad, you were instrumental in raising a son to be successful and to be a role model to others. I love you all!

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I would like to thank my dissertation chair, Dr. Shari Jorissen, and committee member, Dr. Mike Brunet, for their steadfast guidance, support, and mentorship during this arduous endeavor. Dr. Shari, your commitment to excellence and organization has made me a better person. I am grateful for your assistance and am honored to have worked with you.

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Chapter 1: Introduction to the Study

Introduction

Noncommunicable diseases (NCDs) are categorized into four major disease areas: cardiovascular conditions, chronic respiratory disease, cancers, and diabetes (Katz, 2013). In 2011, the General Assembly of the United Nations (UN) convened a high-level special meeting of 193 nations to mobilize a global coalition to develop an action plan to combat the NCD epidemic (World Health Organization; WHO, 2014). This special meeting was only the second such meeting in UN history for a global health issue (the last had been in 2001 on HIV/AIDS) (The NCD Alliance, n.d.). The General Assembly ratified a political directive that declared a global war on NCDs (WHO, 2014). Four areas of priority were identified as targets for progress in relation to NCDs: (a) governance, (b) prevention, (c) healthcare, and, (d) surveillance and monitoring (WHO, 2014). The NCD epidemic was not just a high priority but emerged as an organized initiative with the World Health Assembly implementing a global monitoring framework of 25 indicators and nine voluntary global targets that needed to be implemented by 2025 (WHO, 2014).

NCDs are considered to be one of the most wide-reaching challenges facing the global health community, and engagement of patients, families, and communities is essential in developing new chronic disease management (CDM) strategies (FitzGerald & Poureslami, 2014). Potential premature death can be addressed through government policy change, reductions in unhealthy behaviors, and innovation (WHO, 2014). Self-management programs are used in an attempt to engage patients and families to take more active roles in managing a chronic illness through empowerment, education, and

encouragement (Musekamp, Bengel, Schuler, & Faller, 2016). A determining factor of whether self-management programs are successful is through the patient achieving self-efficacy whereby they will take ownership of their NCDs, become better educated on the NCDs they are diagnosed with, and by taking action to mitigate the disease effects to improve their quality of life (QOL; Barley & Lawson, 2016). Program director (PD) and program coordinator (PC) acronyms were used to protect the identity of my research partner and its employees. This chapter includes a discussion of the background of the problem, problem statement, purpose of study, research questions and hypotheses, a brief discussion of the theoretical framework for the study, the nature of the study, definitions, assumptions, scope and delimitations, limitations, and significance of the study.

Background

NCDs are a growing healthcare concern and have both negative health and financial impacts. Many CDM initiatives have consistently failed to decrease mortality and morbidity related to NCDs despite the intentions behind those who have created and implemented those programs (Brunner-La Rocca et al., 2015; Jonkman, Groenwold, Trappenburg, Hoes, & Schuurmans, 2017; Khalil, Chambers, Munn, & Porritt, 2015). The Institute of Medicine (IOM, 2004) recommended that care be made more patient-centric to improve outcomes and QoL for patients with chronic conditions. Health care for chronic conditions is different from care for acute episodic illnesses, and care for the chronically ill needs to be a collaborative, multidisciplinary process (IOM, 2004). The IOM continues to attempt to stimulate innovation and collaboration while also eliminating waste through jettisoning programs that are not effective (IOM, 2004). This

lack of success has fueled discussion on population health, self-management, and alternative delivery models, including those that are community-based, to bend the medical care cost curve (Ingram, Scutchfield, & Costich, 2015). For chronic disease strategies to be effective, a high degree of patient cooperation is required and provider-patient views must change (IOM, 2004). Engaging the patient in the management of their disease and changing attitudes are key to NCD management (Hourzad, Pouladi, Ostovar, & Ravanipour, 2018; O'Connell, McCarthy, & Savage, 2018; Pinchera, DelloIacono, & Lawless, 2018).

It is not uncommon for people with NCDs who have newly been diagnosed to be cavalier about their illness or deny the seriousness of the disorder (American Diabetes Association, 2013). Some patients may not choose to engage in treatment because misinformation affects their attitude toward the disease and they may believe that the benefits of treatment may not be accurate (Li, Drury, & Taylor, 2013). Lack of motivation to manage the disease and being unwilling to change lifestyle choices are also related to negative attitudes towards NCDs and their treatment (Sola, Couturier, & Voyer, 2015). Deficiencies in health literacy have been found to be related to noncompliance with chronic disease treatment activities (Edwards, Wood, Davies, & Edwards, 2012). Persons with chronic disease and illness may also lack the necessary support mechanisms to self-manage their disease and often give up on attempting to care for their disease due to the perceived burden related to lifestyle changes (Maizes, Rakel, & Niemiec, 2009).

The recommendations of both the IOM and the WHO portray NCDs as a clear and present danger to the global population and economies, stressing that urgent action is

required (Katz, 2013; Riley & Cowan, 2015). The increased incidence and burden associated with chronic diseases require the active involvement of the patient in their health maintenance (Novak, Costantini, Schneider, & Beanlands, 2013). Part of this active involvement has been found to be related to how patients' perceive the intervention in relation to its ability to improve their QOL that may have been negatively affected by the development and ongoing effects of the NCD (Cutler, 2018; Whitehead, Jacob, Towell, Abu□qamar, & Cole□Heath, 2018). Despite knowledge that self-care consistency is related to ongoing health status, the sustained development and implementation of self-management, or assisted self-management, is not well documented (Kruk, Nigenda, & Knaul, 2015).

Mobile integrated healthcare (MIH) community paramedicine (CP), which is also known as MIH-CP, is a newer CDM intervention aimed at mitigating the impact of NCDs (Zavadsky & Hooten, 2016). A MIH-CP program was established in 1992 in Red River, New Mexico to fill the voids in a rural area where the closest healthcare services were at least an hour drive away from the primary population (Choi, Blumberg, & Williams, 2016). The program was federally funded and ceased operation in 1997 due to lack of funding and logistical issues, such as physician oversight (White IV, Pruett, & Braunschweiger, 2018). The National Association of EMS Physicians (2012) achieved a consensus declaration in 2012 that MIH and CP would operate under the MIH-CP nomenclature and that physician oversight would be an integral part of these programs.

A fractured healthcare system, inappropriate hospitalizations, and poor care continuity are all reasons why MIH-CP is now delivered in approximately 20 U.S. states,

Canada, and parts of Europe in order to try to help address these gaps and deficiencies (Zavadsky & Hooten, 2016). The U.S. Department of Health and Human Services (HHS) has tasked the Agency for Healthcare Research and the Centers for Medicare and Medicaid Innovation to support efforts that advance healthcare innovation and value-based purchasing initiatives (Zavadsky, Staffan, & Swayze, 2015). The MIH-CP programs are generating some positive results. For example, one program in Florida achieved a 40% reduction in hospital admissions while simultaneously improving QOL for those who used the services (Nejtek, Aryal, Talari, Wang, & O'Neill, 2017a). In this study, I explored the relationship between NCD type (i.e., cardiovascular conditions, chronic respiratory disease, cancers, and diabetes), age, gender, duration of participation in MIH-CP, hospital readmission, and self-reported perceived QOL for those who have participated in the MIH-CIP program in order to determine how the program impacted perceived QOL for those who have NCDs.

Problem Statement

According to the 2014 Global Status Report on NCDs from the WHO (2014b), an estimated 38 million deaths were attributed to NCDs in 2012. Of this number, 42% (i.e., 16 million) were considered premature and avoidable (WHO, 2014). Premature death (i.e., before the age of 70 years old) is a global epidemic that the WHO (2014) aims to reduce by 25% by 2025. Bloom et al. (2011) indicated that the worldwide economic disruption associated with NCDs could be as devastating as the diseases alone because the projected global economic burden is estimated to reach $47 trillion by 2030. In 2014, the annual economic burden of NCDs in the United States was $1.3 trillion, including

treatment and productivity losses (Chatterjee, Kubendran, King, & DeVol, 2014). Multiple chronic conditions (MCCs) contribute to the economic burden as well because 25% of adults have more than one chronic condition (Ward, Schiller, & Goodman, 2014). The WHO indicated that any delay in mitigating the NCDs epidemic could continue to increase the human and socioeconomic burden. Therefore, the problem that I addressed in this study was the negative outcomes related to NCDs, including decreased QOL (Banik, Schwarzer, Knoll, Czekierda, & Luszczynska, 2018; Cannon et al., 2016; Dodds, Bjornson, Sweeney, & Narayanan, 2015; Fang-Ju Lin et al., 2014); premature and untimely deaths (Abajobir et al., 2017, 2017; Centers for Disease Control and Prevention, 2017b; Namazi Shabestari et al., 2015; WHO, 2018c); and increased costs to individuals, families, communities, and societies (Schofield et al., 2016) due to inadequate interventions available to assist in the ongoing health condition managements for these individuals (Brunner-La Rocca et al., 2015; Cutler, 2018; Jonkman et al., 2017; Khalil et al., 2015).

Considerable research regarding traditional chronic care management exists (Bandura, 2004; Bergner, 1989; Creer & Holroyd, 2006; Dennis et al., 2008; Emerson et al., 2016; Farrell, Wicks, & Martin, 2004; Fu, Fu, McGowan, & Yi-e, 2003; Hartmann & Hall, 1976; Hayman, Hochbaum, & Hoffman, 1971; Heo & Braun, 2014; Hunt, Kreiner, & Brody, 2012; Kruk, Nigenda, & Knaul, 2015; Lorig & Holman, 2003; Musekamp et al., 2016; Ouwens, Wollersheim, Hermens, Hulscher, & Grol, 2005; Ryan & Deci, 2000; Savage et al., 2016; Stock et al., 2014; Whittington, Nolan, Lewis, & Torres, 2015; Woolf, Dekker, Byrne, & Miller, 2011), however, few researchers have focused on those

with NCDs and their perceived QOL (Gemmell et al., 2016; McCusker et al., 2019; Mussa, Tonyan, Yi-Fan Chen, & Vines, 2018; Zimmermann, Silva, Galvao, & Pereira, 2017). Although the aforementioned research regarding the NCD epidemic illuminated important findings, I have not found any researchers who have examined the effectiveness of the intervention of MIH-CP as a potential model for mitigating the chronic disease epidemic in relation to the perceived QOL of those who participated in the program. Given such, further research was warranted that could examine this lack of research in an effort to address the global problem of NCDs and perceived quality of life (see WHO, 2014).

Purpose of the Study

MIH-CP is a specially designed, home-based program that assists persons in managing various NCDs with treatment, testing, and counseling for a specified period of time (Zavadsky & Hooten, 2016). MIH-CP programs can be customized by engaging a variety of health care providers, such as emergency medical technicians (EMTs), paramedics, registered nurse practitioners, and physicians' assistants (Zavadsky et al. 2016). The purpose of this pretest/posttest design using secondary data where the organization providing the data implemented the intervention was to investigate the relationship between NCD type (i.e., cardiovascular conditions, chronic respiratory disease, cancers, and diabetes), age, gender, duration of participation in MIH-CP, hospital readmission, and self-reported perceived QOL as measured by Euroqol QOL survey (EQ-5D-3L). The perceived QOL was measured by the EQ-5D-3L before entering MIH-CP

and after completing MIH-CP; the differences between those scores were each related to separate research questions posed in this study.

Research Questions and Hypotheses

RQ1: What is the relationship between NCD type (i.e., cardiovascular conditions, chronic respiratory disease, cancers, and diabetes), age, gender, duration of participation in MIH-CP, hospital readmission, and self-reported perceived QOL as measured by EQ-5D-3L before entering the MIH program?

$H_0$1: There is no statistically significant relationship between NCD type (i.e., cardiovascular conditions, chronic respiratory disease, cancers, and diabetes), age, gender, duration of participation in MIH-CP, hospital readmission, and self-reported perceived QOL as measured by EQ-5D-3L before entering the MIH program.

H_A1: There is a statistically significant relationship between NCD type (i.e., cardiovascular conditions, chronic respiratory disease, cancers, and diabetes), age, gender, duration of participation in MIH-CP, hospital readmission, and self-reported perceived QOL as measured by EQ-5D-3L before entering the MIH program.

RQ2: What is the relationship between NCD type (i.e., cardiovascular conditions, chronic respiratory disease, cancers, and diabetes), age, gender, duration of participation in MIH-CP, hospital readmission, and self-reported perceived QOL as measured by EQ-5D-3L after completing the MIH program?

$H_0$2: There is no statistically significant relationship between NCD type (i.e., cardiovascular conditions, chronic respiratory disease, cancers, and diabetes), age, gender, duration of participation in MIH-CP, hospital readmission, and self-reported perceived QOL as measured by EQ-5D-3L after completing the MIH program.

H_A2: There is a statistically significant relationship between NCD type (i.e., cardiovascular conditions, chronic respiratory disease, cancers, and diabetes), age, gender, duration of participation in MIH-CP, hospital readmission, and self-reported perceived QOL as measured by EQ-5D-3L after completing the MIH program.

RQ3: What is the difference between pre-participation and post-participation scores of self-reported, perceived QOL as measured by EQ-5D-3L in those who participated MIH program?

$H_0$3: There is no statistically significant difference between pre-participation and post-participation scores of self-reported, perceived QOL as measured by EQ-5D-3L in those who participated MIH program.

H_A3: There is a statistically significant difference between pre-participation and post-participation scores of self-reported, perceived QOL as measured by EQ-5D-3L in those who participated MIH program.

RQ4: What is the relationship between NCD type (i.e., cardiovascular conditions, chronic respiratory disease, cancers, and diabetes), age, gender, duration of participation in MIH-CP, hospital readmission, and pre-participation/post-participation score difference of

perceived QOL as measured by EQ-5D-3L in individuals who participate in the MIH program?

$H_0$4: There is no statistically significant relationship between NCD type (i.e., cardiovascular conditions, chronic respiratory disease, cancers, and diabetes), age, gender, duration of participation in MIH-CP, hospital readmission, and pre-participation/post-participation score difference of perceived QOL as measured by EQ-5D-3L in individuals who participate in the MIH program.

H_A4): There is a statistically significant relationship between NCD type (i.e., cardiovascular conditions, chronic respiratory disease, cancers, and diabetes), age, gender, duration of participation in MIH-CP, hospital readmission, and pre-participation/post-participation score difference of perceived QOL as measured by EQ-5D-3L in individuals who participate in the MIH program.

Theoretical Foundation

I used the health belief model (HBM) as the theoretical framework for this study. The creation of the HBM was motivated by social psychologists (i.e., Hochbaum, 1958; Rostenstock, 1966) who sought to explain and predict certain health behaviors using psychological models (Abraham & Sheeran, 2015). Rosenstock (1974) developed the HBM to explain why people did not participate in a disease prevention program for tuberculosis. Even when patients were formally diagnosed with the disease, Rosenstock (2000) found that compliance with prescribed medical regimens was highly influenced by belief and perception. The HBM has provided a valuable framework for researchers to

understand individual beliefs and behavior patterns in order to develop useful interventions for changing high-risk behavior (Abraham & Sheeran, 2015).

The HBM is used to assess a person's individual values and expectations for avoiding disease and what they expect to achieve from engaging in a healthier lifestyle, behavior, or intervention (i.e., value-expectancy theory; Boslaugh, 2013). The HBM was developed for the U.S. Public Health Service as a means for understanding why some persons take proactive steps to improve their health, while others do not (Boslaugh, 2013). According to Boslaugh (2013), the original HBM was modernized to incorporate self-efficacy since an individual must possess the confidence and belief that they possess the ability to make the required behavioral changes to improve their health.

The modernized HBM is based on six individual health perceptions:

1. *Susceptibility* is the personal belief that an individual maintains concerning their likelihood of developing a chronic disease.
2. *Severity* is the personal assessment and interpretation of how sick the patient believes they are or how sick they will become.
3. *Benefits* is the value that a person places on changing their health behavior to minimize disease susceptibility or the effects that a particular disease may have on them. This benefit is often weighed against the costs of doing something or doing nothing.
4. *Barriers* are the personal, social, and financial costs associated with the necessary change.

5. *Cue to action* is the signal an individual receives by considering all of the beliefs whereby they to make the required changes.
6. *Self-efficacy* is an individual's belief of whether they have the ability to achieve the goals they have established (Jalilian, Motlagh, Solhi, & Gharibnavaz, 2014):.

The HBM is among the 10 most frequently cited theories that researchers and practioners use to guide health education and promotion (Alatawi, Kavookjian, Ekong, & Alrayees, 2016; Angeles et al., 2014; Bishop, Baker, Boyle, & MacKinnon, 2015; Dempster, Wildman, Masterson, & Omlor, 2018; Guilford, McKinley, & Turner, 2017; Halpin, Perkins, & Huang, 2014; Lee, Sobralske, & Fackenthall, 2016; Long, Ponder, & Bernard, 2017; Martinez et al., 2016; Mudd-Martin et al., 2015; Peachey, Sutton, & Cathorall, 2016; Rom Korin et al., 2013). The HBM has been consistently identified as a grounding theory for examining the driving forces behind maintaining and changing health behaviors (Köhler, Nilsson, Jaarsma, & Tingström, 2017; Mou, Shin, & Cohen, 2016). The theory can be applied in both qualitative and quantitative inquiries (Köhler et al., 2017). The HBM has been a guiding force behind many CDM initiatives for persons with diabetes, chronic pulmonary disease, and cardiovascular disease (Arredondo et al., 2013; Bourbeau et al., 2018; Jalilian et al., 2014; Wang et al., 2014).

MIH-CP is an education-based, CDM intervention that is designed to assist patients who are diagnosed with NCDs improve their understanding of the susceptibility and severity of their disease, how they can benefit from participating in the intervention, how they can overcome the barriers to undertaking recommended health actions, and how

to recognize the cues to acting in a responsible manner by changing their unhealthy behaviors (Zavadsky & Hooten, 2016). Through a comprehensive review of the literature, I found sufficient evidence that the HBM was appropriate for this study because it has many worldwide applications. With regard to improved health related quality of life (HRQOL) outcomes, demonstration of the MIH-CP model may influence health policy experts, healthcare payers, and government agencies to integrate the program into existing CDM mitigation efforts (Arndt, 2018). Improving the HRQOL for persons with NCDs has the potential for positive social change because QOL has been found to be related to adherence to healthcare interventions (McCusker et al., 2019; Mussa et al., 2018); treatments (Mussa et al., 2018; O'Connell et al., 2018); and ongoing positive healthcare outcomes (Cutler, 2018; Pinchera et al., 2018; Whitehead et al., 2018).

Nature of the Study

I used a pretest/posttest design in this study using secondary data where the organization providing the data implemented the intervention. This was a true pretest/posttest design because the organization collects data on perceived QOL before individuals start their program and after they have completed it, using a reliable and valid instrument. This research design naturally transferred to my research study because it is the method used by the organization. Pretest/posttest research designs are also commonly used in healthcare settings because researchers and practitioners in healthcare settings working with health interventions need to be able to demonstrate if treatments and interventions are effective or not (Baraz, Zarea, & Shahbazian, 2017; Chapman,

2018; Jacome & Marques, 2014; Naseer et al., 2017; Wittig-Wells et al., 2015). When comparing the measurable difference between the pretest and posttest scores, it could be inferred that the process of going through MIH-CP program was related to any change between the scores related to health-related QOL; although, causation cannot be established through one study (see Frankfort-Nachmias & Nachmias, 2008b).

The pretest-posttest design is a good choice when conducting research on interventions related to QOL (Abbasi, Najafi Ghezeljeh, Ashghali Farahani, & Naderi, 2018; Bullen, Awdishu, Lester, Moore, & Trzebinska, 2018; Emerson et al., 2016; Gogia & Begum, 2018). Another realm of healthcare research where pretest-posttest designs are used is in the area of pilot studies, which are used to identify if programs need to be altered based on patient outcomes before moving to full implementation (Martínez-Martínez et al., 2017). Since the MIH-CP intervention is still being piloted throughout many regions of the United States (Choi et al., 2016), a pretest-posttest design seemed reasonable for this study.

The independent variables for this study were NCD type, age, gender, duration of participation in MIH-CP, and hospital readmission (all related to Research Questions 1, 2, and 4). There were three dependent variables for this study; these were used to address different research questions and not combined. The first dependent variable was the patient's self-perceived QOL prior to the MIH-CP intervention program as measured by the EQ-5D-3L (i.e., pretest score; related to Research Question 1). The second dependent variable was the patient's self-perceived QOL after the MIH-CP intervention program as measured by the EQ-5D-3L (i.e., posttest score; related to Research Question 2). The

third dependent variable was the calculated difference in the patient's self-reported QOL between the pretest and posttest scores (related to Research Questions 3 and 4).

I minimized resource constraints in the data retrieval and design methodology for this study by using secondary data. The nonexperimental use of a secondary data set also eliminated the time and resources required to recruit, participate, and collect data for this study. The research partner organization supported this study and gave permissions for the organization's name to be associated with the study. Despite obtaining the organization's permission to associate their name with the study, I have masked the partner organization's name in compliance with Walden institutional review board (IRB) policy.

The power analysis results indicated that the data from 327 cases were required for this study (see Chapter 3 for detailed explanation of this calculation). However, the partner organization reported that they had data for over 800 cases, so I used all cases in the secondary data set as long as variable data were complete for each case and each case could be included once and checked for inconsistencies and errors. The data were analyzed using multiple linear regression analyses (for Research Questions 1, 2, and 4) to determine if there were statistically significant relationships between the included variables and paired *t*-test analyses (for Research Question 3) to determine if there were statistically significant changes in measured, perceived QOL before and after participating in the MIH-CP program. I used these results to answer the research questions and corresponding hypotheses. The data were analyzed using the statistical package for the social sciences (SPSS), Version 25.

Definitions

The following phrases and terms are used throughout this study:

Chronic disease management (CDM): The process used by various healthcare professionals to diagnose, treat, and attempt to mitigate a wide-range of chronic, NCDs (Jonkman et al., 2017).

Community paramedic (CP): An individual who is a state licensed or certified emergency medical services professional that has received additional training beyond the scope of emergency medical care. This training may include education on CDM, point-of-care laboratory testing, patient education, and disease prevention (Rural Health Information Hub, 2018; Zavadsky & Hooten, 2016).

EuroQol-5D-3L Health Questionnaire (EQ-5D-3L): A survey instrument designed to collect data on a patient's self-reported, perceived QOL (Euroqual Research Foundation, 2019).

Health-related quality of life (HRQOL): An individual's or group's perceived physical and mental health over a period of time (Centers for Disease Control and Prevention, 2018c).

Mobile integrated healthcare (MIH): A patient-centered program of care where emergency medical service professionals use the knowledge and skills they received through advanced training to assist patients with managing a chronic illness, to provide posthospitalization follow up, to improve patients' overall experience with care, and to reduce or prevent hospital admissions and readmissions (Perry, 2015; Siddle et al., 2018a; Zavadsky & Hooten, 2016).

Noncommunicable disease (NCD): Chronic diseases that are of long duration and resulting from a combination of genetic, physiological, environmental, and behavioral causes (WHO, 2018d).

Paramedic (EMT-P): An allied health professional who is trained using the national emergency medical services scope of practice model to provide advanced emergency medical care for critical and emergent persons who access the emergency medical system (National Registry of EMTs, n.d.).

Quality of life (QOL): A term that is used interchangeably with HRQOL to describe an individual's or group's perceived physical and mental health over a period of time (Centers for Disease Control and Prevention, 2018c).

Assumptions

I made several assumptions in this study. The first of which was that the data set provided by research partner organization included truthful and accurate responses from the participants. The research partner program coordinator (PC, 2016) reported that MIH-CP staff followed a standardized interview and data entry process to ensure that the data were accurate and correct. Without reliable and truthful answers to the EQ-5D-3L survey questions, the validity of the study would be jeopardized (Creswell & Creswell, 2018; Frankfort-Nachmias & Nachmias, 2008c; Lavrakas, 2018). A second assumption was that the research partner organization evaluated each participant of the MIH-CP program based on the organizations inclusion and exclusion criteria (see Partain, 2016; Zavadsky, 2016); this is further discussed in Chapter 3. A third assumption was that research partner organization administered the EQ-5D-3L in accordance with the

prescribed guidance for operationalizing the Euroqual survey instrument (see Euroqual Research Foundation, 2019).

Scope and Delimitations

The scope of the study was defined by the data that were supplied by the partner organization. I designed this study to analyze QOL data and general nominal measurements (see Frankfort-Nachmias & Nachmias, 2008b), such as age, gender, NCD type, and hospital readmission. At no time was there an attempt to identify the participants of this study. The agreements for data access and analysis stated that participants were to be de-identified. The secondary data set included data from 2015 through December 31, 2018. I placed a delimitation on the study to only analyze data from 2016 through 2018. This delimitation was imposed because the research partner organization's early data collection efforts were not fully standardized within the organization. To manage the scope of the research, I selected independent variables that reasonably represented a cross-section of information that was used to study my research questions. This study was also delimited by the respondents of the EQ-5D-3L survey in that the urban demographic that is represented by this population may not be generalizable to other geographical locations. Generalizability is highly dependent on sound research design and the internal validity of the study (Kukull & Ganguli, 2012; Lesko et al., 2017). Whether the results of a study are generalizable are judgmental decisions based on statistical inference (Kukull & Ganguli, 2012). Lastly, I did not investigate the operations or patient satisfaction scores of the organization in this study; rather, I focused on the pretest and posttest EQ-5D-3L scoring as it related to QOL.

Limitations

I anticipated a limitation with the reliability and validity of the data collection tool used by the research partner organization. The EQ-5D-3L is a valid survey instrument, but it may lack the sensitivity and precision of other tools (Janssen, Bonsel, & Luo, 2018). Janssen et al. (2018) reported that the EQ-5D-5L was superior to the EQ-5D-3L in some respects and could lead to bias due to overestimating health problems. The instrumentation used by the research partner organization was a limitation, but the data collected were still adequate for the current study.

Because there was no independent means to verify that the information provided for the current study was from survey participants, the content validity of the study was also limited. The reporting instrument was not be able to accurately account for this concern or the operating aspects of the organization supplying the data (see Bevan, Baumgartner, Johnson, & McCarthy, 2013). It was also impossible to ascertain the degree to which administrative and operations affected the answering of questions when administering the survey instrument. The EQ-5D-3L was administered via a face-to-face, personal interview that permitted a control of the situation, higher response rates, and more robust information (Frankfort-Nachmias & Nachmias, 2008b). However, the authors also reported that interviewer bias may be a concern due to the personal characteristics of the interviewer. While this bias could not be ruled out, the research partner organization assured me that all MIH-CP personnel have received training on how to administer the survey instrument in a consistent and standardized manner (see PC, 2016).

Significance

The results of this study could promote positive social change for persons with NCDs by providing new information on an intervention that may improve their QOL. This social change could provide knowledge sharing among health professionals seeking to mitigate the global impact of NCDs and for world's health policy makers seeking to improve access and care. Additionally, the results of this study could provide motivation for others to conduct additional research on the intervention that may further advance the self-management of chronic disease.

Summary

The 2011 meeting of the UN General Assembly formally mobilized a global coalition to combat the NCD epidemic that is causing premature death and decreased QOL (WHO, 2014). NCDs are considered to be one of the most wide-reaching challenges facing the global health community, and engagement of patients, families, and communities is essential in developing new CDM strategies (FitzGerald & Poureslami, 2014). Self-management programs are used in an attempt to engage patients and families to take more active roles in managing a chronic illness through empowerment, education, and encouragement. MIH-CP is a specially designed, home-based program that assists persons (through engagement) in managing various NCDs with treatment, testing, and counseling for a specified period of time (Zavadsky & Hooten, 2016).

The purpose of this quantitative study was to investigate the relationship between NCD type; age; gender; duration of participation in MIH-CP; hospital readmission; and self-reported, perceived QOL as measured by the EQ-5D-3L for those who received

services from the MIH-CP program. Extensive research exists regarding the traditional treatment for NCD and the desire to improve QOL (Alpert, 2016; Brunner-La Rocca et al., 2015; Jonkman et al., 2017; Khalil et al., 2015; McBrien et al., 2018; Musekamp et al., 2016; Parks et al., 2017; Reynolds et al., 2018; Schofield et al., 2016; Ward et al., 2014). My extensive review of the literature showed no information existed regarding the influence of MIH-CP on improving QOL for persons with NCD. It was important that additional information was obtained to determine the relationship between MIH-CP and improved QOL to determine what research, if any, had already be conducted. The findings of this study may reveal useful information that will enhance NCD management and improve the QOL for persons who are afflicted with NCD.

The HBM provided an appropriate theoretical framework for this study and enabled the analysis of behaviors that influence compliance with existing NCD management models. MIH-CP is an education-based, CDM intervention that is designed to assist patients who are diagnosed with NCDs improve their understanding of the susceptibility and severity of their disease, how they can benefit from participating in the intervention, how they can overcome the barriers to undertaking recommended health actions, and how to recognize the cues to acting in a responsible manner by changing their unhealthy behaviors (Zavadsky & Hooten, 2016). A comprehensive review of the literature found sufficient evidence that the HBM was appropriate for this study because it has many worldwide applications. With regard to improved HRQOL outcomes, demonstration of the MIH-CP model may influence health policy experts, healthcare

payers, and government agencies to integrate the program into existing CDM mitigation efforts (Arndt, 2018).

I used a pretest/posttest design in this study, making use of secondary data where the organization providing the data (i.e., the research partner organization) implemented the intervention. This was a true pretest/posttest design because the organization collected data on perceived QOL before individuals started their program and after they completed it, using a reliable and valid instrument. This research design naturally transferred to my research study because it was the method used by the organization. Pretest/posttest research designs are also commonly used in healthcare settings because researchers and practitioners in healthcare settings working with health interventions need to be able to demonstrate if treatments and interventions are effective or not (Baraz et al., 2017; Chapman, 2018; Jacome & Marques, 2014; Naseer et al., 2017; Wittig-Wells et al., 2015). When comparing the measurable difference between the pretest-posttest scores, it could be inferred that the process of going through MIH-CP program was related to any change between pretest and posttests scores related to HRQOL; although, causation cannot be established through one study (see Frankfort-Nachmias & Nachmias, 2008b).

The independent variables for this study were NCD type, age, gender, duration of participation in MIH-CP, and hospital readmission (all related to Research Questions 1, 2, and 4). There were three dependent variables for this study; however, these were used to address different research questions and not combined. The first dependent variable was the patient's self-perceived QOL prior to the MIH-CP intervention program as

measured by the EQ-5D-3L (pretest score; related to Research Question 1). The second dependent variable was the patient's self-perceived QOL after the MIH-CP intervention program as measured by the EQ-5D-3L (posttest score; related to Research Question 2). The third dependent variable was the calculated difference in the patient's self-reported QOL between the pretest and posttest scores (related to Research Questions 3 and 4).

Secondary data for this study was provided by the research partner organization. I minimized resource constraints in the data retrieval and design methodology for this study by using secondary data. The nonexperimental use of a secondary data set also eliminated the time and resources required to recruit, participate, and collect data for this study. The research partner organization supported this study and gave permission for the organization's name to be associated with the study as illustrated in the data use agreement (see Appendix A). Despite obtaining the organization's permission to associate their name with the study, I have masked the partner organization's name in compliance with Walden IRB policy.

The next chapter contains a comprehensive review of the literature on the effects of NCD, disease management models, literature search strategies, and theoretical foundations that support the study. Literature pertinent to CDM and improving the QOL for persons affected by NCDs was at the core of this research. The findings of this study have the potential to provide information that may be useful in mitigating the devasting effects associated with chronic illness. Investigating the possible methods of reversing the worldwide epidemic of NCDs could have significant implications for social change by improving the QOL for those who are afflicted with chronic diseases.

Chapter 2: Literature Review

Introduction

NCDs are the world's leading cause of death and have been the focus of prevention and mitigation measures by the WHO (2014) since 2010, when they published the first, triennial, global status report on NCDs. The WHO determined in 2011 that NCDs were a global epidemic because of the devasting human and socioeconomic impact they have on the human population and the economies of all nations. It is estimated that the global financial impact associated with the premature death from NCDs will result in a cumulative economic cost of $47 trillion between 2011 and 2030 (Kaiser Foundation, 2017).

In 2011, the General Assembly of the UN convened a high-level special meeting of 193 nations to mobilize a global coalition to develop an action plan to combat the NCD epidemic (WHO, 2014). This special meeting was only the second such meeting in UN history for a global health issue (the last had been in 2001 on HIV/AIDS; The NCD Alliance, n.d.). The General Assembly ratified a political directive that declared a global war on NCDs (WHO, 2014). Four areas of priority were identified as targets for progress: (a) governance, (b) prevention, (c) health care, and (d) surveillance and monitoring (WHO, 2014). The NCD epidemic was not just a high priority but emerged as an organized initiative with the World Health Assembly also implementing a global monitoring framework of 25 indicators and nine voluntary global targets that needed to be implemented by 2025 (WHO, 2014).

The next WHO Global status report has not yet been published, but they track progress regularly (WHO, 2017). The WHO (2017) reported for 2016 that NCDs annually accounted for the deaths of an estimated 41 million persons worldwide. The WHO also reported for 2016 that 15 million of these deaths were premature, occurring in persons between the ages of 30 and 69 years old. NCD deaths were mostly predominant among low to low-moderate income nations (WHO, 2017). The 2016 data indicated nearly that 32 million premature deaths in these areas were attributed to NCDs compared to 28 million deaths in 2014 (Riley, Gouda, Cowan, & WHO, 2017).

The incidence and cost for all major categories of NCDs (i.e., cardiovascular conditions, chronic respiratory disease, cancers, and diabetes) continues to rise, and current CDM strategies do not appear to be effective (Alpert, 2016; Allegrante, 2018; Emerson, Graham, Hall, Smith, & Wilson, 2016). Chronic disease management (CDM) strategies have substantially changed over the past 10 years, and self-management support is the most frequent chronic care model that is associated with improvements in QoL and care compliance (Reynolds et al., 2018). The importance of mitigating NCDs could not be more evident given the global impact of increase prevalence and rising mortality and morbidity (Tougas, Hayden, McGrath, Huguet, & Rozario, 2015).

Considerable research regarding traditional chronic care management exists (Bandura, 2004; Bergner, 1989; Creer & Holroyd, 2006; Dennis et al., 2008; Emerson et al., 2016; Farrell et al., 2004; Fu et al., 2003; Hartmann & Hall, 1976; Hayman et al., 1971; Heo & Braun, 2014; Hunt et al., 2012; Kruk et al., 2015; Lorig & Holman, 2003; Musekamp et al., 2016; Ouwens et al., 2005; Ryan & Deci, 2000; Savage et al., 2016;

Stock et al., 2014; Whittington et al., 2015; Woolf et al., 2011); yet, there has not been an adequate investigation into contemporary CDM initiatives such as MIH-CP (Bigham, Kennedy, Drennan, & Morrison, 2013; Daly, 2012; "Doctor 911 Rural areas seek expanded roles for paramedics," 2011; "EMS Leaders Meet at Conference on Community Paramedicine," 2012; Erich, 2013, 2015; Glendenning & Jones, 2015; Ludwig, 2012; O'Connor, 2015; Williams, 2013; Wingrove, 2011; Wingrove, O'Meara, & Nolan, 2015; Zavadsky & Hooten, 2016). Further research is warranted that could examine this lack of research in an effort to address the ineffectiveness of current chronic disease strategies (Allegrante, 2018; Alpert, 2016; Emerson et al., 2016). By investigating the dearth of research in contemporary CDM, it could be determined if MIH-CP can reverse the lack of success (Zavadsky, Staffan, et al., 2015).

The purpose of this quantitative study was to investigate the relationship between an emerging model of chronic care management, known as MIH-CP, and improved HRQOL. MIH-CP is a specially designed, home-based program that assists persons in managing various NCDs with treatment, testing, and counseling for a specified period of time (Zavadsky & Hooten, 2016). Zavadsky et al. (2016) insist that MIH-CP programs can be customized by engaging a variety of healthcare providers, such as EMTs, EMT-Ps, registered nurse practitioners, and physicians' assistants. With regard to improved HRQOL outcomes, demonstration of the MIH-CP model may influence health policy experts, healthcare payers, and government agencies to integrate the program into existing CDM mitigation efforts (Arndt, 2018).

Chapter 2 is divided into five sections. In the first section, I summarize the literature search strategy. The second section is a description of the theoretical framework for this study and serves as an agenda for a critical review of the contemporary literature relevant to CDM, NCD, and disease management innovations such as MIH-CP. The lack of empirical research data on MIH-CP shifted the primary focus of the literature review to CDM models, which were closely aligned with the principles of MIH-CP. In the third section, I address key concepts related to the study, such as the incidence and history of NCD, a historical overview of NCD, current NCD statistics, and disease categorization. The fourth section contains a comparison and contrast of MIH-CP and other CDM models. The fifth section is comprised of the details of MIH-CP throughout North America and Europe.

Literature Search Strategy

The lack of empirical research on MIH-CP made for a challenging literature search. For this literature review, I primarily obtained articles and research studies from peer-reviewed journals. Aside from foundational literature, I focused my search on published works from between 2013 and 2018. During my review, I identified pertinent literature prior to this period that was foundational to supporting the movement toward improved chronic care models and made the decision to include a small portion of these works. The use of non-peer-reviewed material included informational data from both governmental and organizational websites as well as subject matter books, conference proceedings, and interview notes from my observation of an active MIH-CP program.

These resources were used cautiously and only to obtain informational material available to the general public on the topics of NCDs, CDM, and MIH-CP.

I obtained relevant literature by searching multiple databases, including Academic Search Complete, ProQuest Central, CINAHL, MEDLINE Simultaneous Search, Ovid Nursing Journals, ProQuest Health & Medical Complete, and Science Direct. The following key search word combinations and variations were utilized: *community paramedicine, paramedicine, community paramedic, mobile healthcare, mobile integrated healthcare, chronic disease, noncommunicable disease, chronic disease management, chronic disease health policy, cost of chronic disease, health belief model, self-efficacy, self-management, self-regulation, chronic disease management models, patient attitudes for chronic disease, provider attitudes for chronic disease,* and *patient navigation*. Works involving pediatric participants were excluded from the literature review because an accurate analysis of the self-management literature requires that studies of adult and pediatric subjects remain separate. Considering that this study was confined to adult participants, works by researchers reporting primary research in pediatric populations were excluded from this review.

Theoretical Foundation

The management of chronic disease is complex and challenging due to the fundamental design of most global health systems (Reynolds et al., 2018). Reynolds (2018) suggested the traditional chronic care models be revised so that patient-centered, disease-specific care becomes the primary focus for addressing chronic diseases. Improved disease outcomes are frequently associated with sustained self-management

programs that change patient behavior, but due to the complexity of human behavior, it is often difficult to thoroughly explain the motives with one overarching theory (Ko, Bratzke, & Roberts, 2018).

I used the HBM as the theoretical foundation for this study. The creation of the HBM was motivated by social psychologists (i.e., Hochbaum, 1958; Rostenstock, 1966) who sought to explain and predict certain health behaviors using psychological models (Abraham & Sheeran, 2015). Rosenstock (1974) developed the HBM to explain why people did not participate in a disease prevention program for tuberculosis. Even when patients were formally diagnosed with the disease, Rosenstock (2000) found that compliance with prescribed medical regimens was highly influenced by belief and perception. The HBM has provided a valuable framework for researchers to understand individual beliefs and behavior patterns in order to develop useful interventions for changing high-risk behavior (Abraham & Sheeran, 2015).

The HBM is used to assess a person's individual values and expectations for avoiding disease and what they expect to achieve from engaging in a healthier lifestyle, behavior, or intervention (i.e., the value-expectancy theory; Boslaugh, 2013). The HBM was developed for the U.S. Public Health Service as a means for understanding why some people take proactive steps to improve their health, while others do not (Boslaugh, 2013). The modernized HBM incorporates self-efficacy since an individual must possess the confidence and belief that they possess the ability to make the required behavioral changes to improve their health (Boslaugh, 2013).

Propositions and Constructs of the HBM

The modernized HBM is based on six individual health perceptions: susceptibility, severity, benefits, barriers, cues to action, and self-efficacy (Jalilian et al., 2014).

Susceptibility. The perceived susceptibility belief is the notion that an individual has that they are susceptible to a particular disease or condition, including the acceptance that they have been diagnosed with a particular disease or condition (Rosenstock, 2000). A common psychological factor associated with serious illness is denial, so it would not be uncommon for a person to minimize their susceptibility (Gagani, Gemao, Relojo, & Pilao, 2016). Susceptibility equates to vulnerability, and a higher the degree of vulnerability may lead to an increased likelihood of action by the patient (Mou et al., 2016). Additionally, the family of a patient may also influence behavior to act because they feel the patient is at risk for developing a specific disease or condition (Köhler et al., 2017).

Severity. The perceived severity belief is described as the feelings a person has regarding the seriousness of contracting a particular disease or condition and includes how serious the condition may become if left untreated (Rosenstock, 2000). How a patient or family member interprets comments from healthcare providers may cause the minimization of the severity of a disease or condition (Köhler et al., 2017). A social component to severity is another factor because people will also evaluate the social penalties of not seeking treatment when they perceive the severity to be greater (Mou et al., 2016).

Perceived benefit. The perceived benefit belief will vary among individuals due to their own belief regarding the effectiveness of certain actions or interventions (Rosenstock, 2000). Rosenstock (2000) argued that the perceived benefit does not need to be health-related and that it could be some other benefit such as an economic or social one. Some researchers contend that the perceived benefit must be greater than the potential barriers to behavioral change (Mou et al., 2016).

Barriers to change. The perception of barriers to change is individualistic in that each person uses a subconscious process to analyze their need to act based on a cost versus benefit notion (Rosenstock, 2000). When an individual deems the change to be too costly, they are less likely to make the necessary change (Carpenter, 2010). Carpenter (2010) further clarified the explanation by discussing how a patient may avoid a painful diagnostic procedure, despite evidence they may benefit from it. In this case, pain is the barrier to change.

Cue to action. The cue to action is the mechanism an individual uses to activate the required behavioral change (Rosenstock, 2000). Rosenstock (1966) originally believed that the cues could originate from both internal and external sources such as a feeling of illness or a response to a health promotion advertisement (Carpenter, 2010). The cues may be wide-ranging triggers that an individual processes in making the determination to take action and includes a personal assessment of all of the perceived variables (Abraham & Sheeran, 2015).

Self-efficacy. A sixth construct was added to the HBM to include self-efficacy when Bandura (1977) first introduced the social cognitive theory and the concept of self-

efficacy (Carpenter, 2010). According to Rosenstock (2000), the self-efficacy construct was readily adopted by the original champions of the HBM because the notion of self-efficacy provided the HBM with greater utility. Bandura (1977) indicated that self-efficacy was the conviction that one possesses to act accordingly to change their behavior so that outcomes were achievable.

Applying the HBM

The HBM is among the 10 most frequently cited theories that guide health education and health promotion (Alatawi et al., 2016; Angeles et al., 2014; Bishop et al., 2015; Dempster et al., 2018; Guilford et al., 2017, 2017; Halpin et al., 2014; Lee et al., 2016; Long et al., 2017; Martinez et al., 2016; Mudd-Martin et al., 2015; Peachey et al., 2016; Rom Korin et al., 2013). The HBM has been consistently identified as a grounding theory for examining the driving forces behind maintaining and changing health behaviors (Köhler et al., 2017; Mou et al., 2016). The theory can be applied in both qualitative and quantitative inquiries (Köhler et al., 2017).

The HBM has been a guiding force behind many CDM initiatives for persons with diabetes, chronic pulmonary disease, and cardiovascular disease (Arredondo et al., 2013; Bourbeau et al., 2018; Jalilian et al., 2014; Wang et al., 2014). Köhler et al. (2017) listed varying opinions and attitudes between patient and spouse, about their coronary heart disease, why they suffered a cardiac event, and how they should change their behavior. While the HBM remains popular with researchers, some controversy of the model exists because the cues to action and the self-efficacy components are frequently excluded by researchers that use the HBM (Jones et al., 2015). To investigate the

controversy, Jones et al. (2015) analyzed variable ranking when applying the HBM to health communication. The researchers learned that three HBM application models may better explain how the framework changes behavior. Jones et al. reported that a complex hierarchy among variables existed; parallel, serial, and moderate mediation modeling. The hierarchy included a moderator (self-efficacy), a mediator (barriers), and a causal chain (barriers leading to benefits).

The HBM remains relevant to current research in behavioral change and chronic conditions. In the Middle East, the HBM has been used to study the effectiveness of diabetes education programs (Jalilian et al., 2014). Using a pre- and posttest questionnaire, researchers investigated self-management behaviors for persons with diabetes before and after an education-based intervention program (Jalilian et al., 2014). Jalilian et al. (2014) reported that the education-based intervention program improved self-management behavior among the participants and that the HBM served as a strong framework for their investigation. Researchers in the Middle East also used the HBM as the theoretical framework for to study the nutritional behaviors of women who have cardiovascular diseases (Ghaffari, Rakhshanderou, Safari-Moradabadi, & Asri, 2018). Ghaffari et al. (2018) also utilized a questionnaire research instrument, that they designed based on the HBM, to investigate whether educational interventions improved the nutritional behavior of participants. The researchers reported that the nutritional behaviors of participants did improve after the educational intervention and that the HBM was a good predictor of engaging in prevention behaviors for cardiovascular disease (Ghaffari et al., 2018).

Researchers used the HBM in Asia as the theoretical framework for studying the efficacy of a nurse navigation intervention for persons with chronic obstructive pulmonary disease (Wang et al., 2014). These authors employed a pre- and posttest questionnaire designed on the HBM to investigate whether a nurse navigation intervention and education program improved HRQOL and improved self-efficacy (Wang et al., 2014). Wang et al. (2014) reported that participants experience improved self-efficacy and improved HRQOL following the HBM grounded nurse navigation program. Another Asian-based study used the HBM to develop a pre-and posttest questionnaire to investigate the acceptance of online health education information in guiding the decision-making behaviors of participants (Mou et al., 2016). Mou et al. (2016) reported that the online education information acceptance was closely aligned with the HBM framework but that no statistical significance was established with regard to self-efficacy. An important aspect of this study was that the intervention (access to online health information) was self-administered.

European researchers believed that the HBM explained why patients with COPD did not comply with pharmaceutical therapy (Khdour, Hawwa, Kidney, Smyth, & McElnay, 2012). Multiple instruments were utilized in this study with one being a HBM-based questionnaire to assess the four primary HBM variables: perceived susceptibility, perceived severity, perceived benefits and perceived barriers (Khdour et al., 2012). The researchers reported that they supported the HBM framework for predicting medication compliance. Khdour et al. (2012) reported that no association was found for the variables

of perceived severity or perceived benefit, but the study did not include an educational component.

International researchers continue to use the HBM as they study why patients have varied beliefs in health prevention and promotion and the common finding among researchers is that the HBM serves as a good theoretical framework for assessing and developing programs aimed at health prevention, improved self-management of disease, and improved HRQOL (Alatawi et al., 2016; Alizadeh et al., 2018; Darabi et al., 2017; Dehdari et al., 2018; Effing, 2015; Esparza-Del Villar et al., 2017; Goong et al., 2016; Jeong & Ham, 2018; Khorsandi et al., 2017; Lee & Lee, 2018; Masiero et al., 2018; Masoudiyekta et al., 2018; Mohsenipouya et al., 2017; Simon, 2013).

Obirikorang et al. (2018) showed that the HBM was generally reliable in assessing the medication compliance for persons with hypertension and that an expanded version should be added to future studies. Alatawi et al. (2018) found the HBM construct of self-efficacy to be a significant predictor of health behavior and treatment adherence. Alizadeh et al. (2018) reported an important relationship between self-efficacy and self-care behaviors for persons with cardiovascular disease. Darabi et al. (2017) used an HBM pre- and posttest questionnaire to assess the effectiveness of a cardiovascular education program in preventing cardiovascular disease in middle-aged women and concluded that the HBM framed education was extremely effective in promoting the prevention of the disease.

In the United States, the HBM continues to be popular among researchers. Horwood et al. (2015) studied the motivations and barriers for attending a cardiac

rehabilitation intervention and guided their investigation using the HBM to examine the reasons why cardiac patients attend rehabilitation. Using pre- and posttest questionnaires, they found that persons who did not engage in cardiac rehabilitation because the program was not personalized to the needs of the participants (Horwood, Williams, & Mandic, 2015). Researchers studying how lifestyle habits differ between cardiac patients and their spouses used the HBM as its foundation (Köhler et al., 2017). Köhler et al. (2017) conducted a qualitative study using the HBM as a grounding framework and reported that the HBM was useful in identifying the differing beliefs of patients and their spouses 1 year after suffering a cardiac event. While the study was of qualitative design, it is important to point out that both patients and spouses agreed that any education and intervention programs must be tailored to the needs of each patient (Köhler et al., 2017). Researchers in the United States also continue to mention the HBM in their research as to why patients have varied beliefs and behaviors in health prevention and promotion with the overarching opinion that the HBM is a valuable theory-based tool for evaluating behaviors of persons with non-communicable diseases, and other modifiable behavioral risks, and for developing education-based interventions aimed at changing unhealthy behaviors and lifestyles (Alatawi et al., 2016; Angeles et al., 2014; Bishop et al., 2015; Dempster et al., 2018; Guilford et al., 2017; Halpin et al., 2014; Katz et al., 2017; Lee et al., 2016; Long et al., 2017; Martinez et al., 2016; Mudd-Martin et al., 2015; Peachey et al., 2016; Rom Korin et al., 2013; Tran et al., 2017).

Rationale for Utilization of the HBM

MIH-CP is an education-based CDM intervention which is designed to assist patients, who are diagnosed with NCDs, to improve their understanding of the susceptibility and severity of their disease, how they can benefit from participating in the intervention, how they can overcome the barriers to undertaking recommended health actions, and how to recognize the cues to acting in a responsible manner by changing their unhealthy behaviors (Zavadsky & Hooten, 2016). A comprehensive review of the literature found sufficient evidence that the HBM was ideal for this study, as it has many worldwide applications. With regard to improved HRQOL outcomes, demonstration of the MIH-CP model may influence health policy experts, healthcare payers, and government agencies to integrate the program into existing chronic disease management mitigation efforts (Arndt, 2018). Improving the HRQOL for persons with NCDs would affect positive social change.

Literature Review Related to Key Variables and/or Concepts

In this section, key concepts related to the study such as incidence and history of NCD, a historical overview of NCD, current NCD statistics, and disease categorization. MIH-CP and other CDM models are also considered in this section. A brief discussion on MIH-CP throughout North America and Europe will conclude this section.

Noncommunicable Diseases (NCDs)

To understand the magnitude of the (NCD) epidemic and why it has proliferated for centuries, it is important to understand the etiology of the problem. Terms like pandemic and epidemic are often associated with communicable disease yet the scientific

community has not reached a consensus on using this terminology for NCD (Allen, 2016). Allen (2016) reported that rhetoric is only adding confusion to a serious NCD problem and that researchers should establish a consensus on what labeling for the problem is appropriate. He also suggests that using the term epidemic may be the only way that the general public understands how serious the NCD problem is.

NCDs are also referred to as chronic disease (WHO, 2015). In 1955, the *Journal of Chronic Disease* made its debut, making the terms chronic disease and chronic illness subjects of interest in the medical and social science communities (Weisz, 2014). Chronic disease became more manageable in the United States and Europe with medical advances but the costs associated with managing prolonged illnesses were not anticipated (Weisz, 2014). In the 1970s, social scientists became involved in the chronic disease movement by identifying behavioral factors influencing chronic disease and illness (Creer, 2000). For nearly 20 centuries, the notion that chronic disease was unique from other illnesses had been widely established, yet the best way to approach the problem has been elusive (Weisz, 2014).

The WHO (2018) reported 56.9 million deaths worldwide for 2016 and 54% were related to ten causes. According to the WHO, the top leading causes of death globally in were (**indicates NCD):

1. Heart diseases- 9.43 million**
2. Stroke- 5.78 million**
3. Chronic obstructive pulmonary diseases- 3.04 million**
4. Lower respiratory infection- 2.96 million

5. Alzheimer's disease and dementias- 1.99
6. Lung cancer- 1.71 million
7. Diabetes- 1.6 million**
8. Road Accidents- 1.40 million
9. Diarrhoeal diseases- 1.38
10. Tuberculosis- 1.29 million

According to the Centers for Disease Control and Prevention (2017), the leading causes of death in the United States ranked in the number of deaths were (**indicates NCD):

1. Heart disease-635,260**
2. Cancer- 598,038
3. Accidents (unintentional injury)- 161,374
4. Chronic respiratory disease- 154,596**
5. Stroke (cerebrovascular diseases)- 142,142**
6. Alzheimer's disease- 116,103
7. Diabetes- 80,058**
8. Influenza and pneumonia- 51,537
9. Nephritis, nephrotic syndrome, and nephrosis- 50,046
10. Intentional self-harm (suicide)- 44,965

Costs associated with NCDs. The costs associated with NCD management remain a challenge. In 2016, NCDs were responsible for 86% of the United States' annual healthcare costs (direct and indirect) with $3 trillion being spent annually to treat

these diseases (Dyke, 2016). The Milken Institute (2016) reported that the direct treatment costs associated with NCD in the United States were $1.1 trillion for 2016 and the indirect costs related to NCDs (lost personal income, reduced productivity, and reduced tax revenues were an additional $2.7 trillion for 2016 (Waters & Graf, 2018). In 2012, NCDs accounted for 52% of premature deaths (persons under age 70). Over three quarters of these NCD deaths were related to cardiovascular diseases (CVD), cancer, diabetes, and chronic respiratory disease (Chatterjee, Kubendran, King, & DeVol, 2014). Individual chronic disease costs (direct and indirect) for the four major categories of NCDS are:

- Cardiovascular diseases- $ 1.39 trillion
- Cancers- $1.44 trillion
- Diabetes (adult)- $527 million
- Lung Diseases- $102 million (Milken Institute, 2016).

The costs associated with NCD in other countries could not be accurately reported because not all countries have disease surveillance and reporting systems so costs are generally approximated (World Health Organization, 2014). The WHO (2014) identified that NCD mitigation was necessary to reduce the socioeconomic hardships which NCDs place on all nations and that no government could ignore the individual, societal, and global burdens associated with NCDs. The WHO (2014, p. xi) estimated that in low- and middle-income countries NCD costs would result in cumulative economic losses of an estimated $7 trillion (US) for the period from 2011-2025. The estimated losses would occur if global nations viewed NCD mitigation with a “business as usual” attitude.

Types of NCDs. There are four main categories of NCDs that will be discussed in this study: cardiovascular diseases, cancers, diabetes mellitus, and respiratory diseases. While cancer may be one of the leading NCDs, and have a high incidence and mortality, the MIH-CP intervention is not utilized for person with cancer. The MIH-CP program addresses behavior change through disease support measures. Cancer treatment and support is not supported through behavior modification. Cardiovascular diseases, diabetes mellitus, and respiratory disease all fall under the realm of the MIH-CP program.

Cardiovascular disease. A number of NCDs fall under the umbrella of (CVD) which is primarily a disease involving the heart and blood vessels (Mayo Clinic, 2016d). CVD may lead to myocardial infarction, stroke, congestive heart failure, arrhythmias (abnormal heart rhythm), and heart valve disorders (American Heart Association, 2018). CVD is the leading cause of death globally and accounted for nearly 17.1 million fatalities in 2015 (WHO, 2018b). According to the WHO (2018), 31% of the global NCD deaths for 2015 were due to CVD. In the United States, CVD is also the leading cause of death with 633,842 deaths reported as of 2017 CDC, 2018b). The American Heart Association (2017) reported that the annual costs associated with CVD in the United States would exceed $1 trillion by 2035 if mitigation measures were not effective.

One of the primary reasons why CVD remains prevalent is due to a causative relationship with diabetes (Burrows, Li, Gregg, & Geiss, 2018) (this will be more thoroughly explained in the diabetes section of this chapter). CVD and diabetes are frequently identified as comorbid conditions because persons with diabetes are at a higher risk for developing CVD (Baumann, Tchicaya, Lorentz, & Le Bihan, 2017; Burrows et

al., 2018). Approximately 40% of adults with diabetes have at least three other chronic conditions (MCC), with one of those conditions predominately diagnosed as some form of CVD (Willey et al., 2018). Persons with MCCs frequently encounter great difficulty managing their comorbidities and often have a decreased health related quality of life (Willey et al., 2018).

HRQOL can be adversely affected by the presence of cardiovascular disease and cardiovascular events (Willey et al., 2018). Those who survive a cardiovascular event are more likely to experience a decreased HRQOL due to frequent hospitalizations and visits to care providers, dependence on multiple medications, and depression due to physical limitations (Banik et al., 2018). According to Banik et al. (2018), improved HRQOL outcomes were associated with the educational aspect of establishing self-efficacy.

Cancer. Types of cancer include breast, colon, lung, and blood cancer (American Cancer Society, 2015) and these classify a varied range of diseases that are characterized by abnormal cell development and activity (Mayo Clinic, 2016a) Cancer has wide-ranging complications that are typically systemic in nature. Cancer is considered a genetic disorder because of the mutation affect it has on cellular structure and function and can cause tumors to form in throughout the body (National Cancer Institute, 2015).

According to the WHO (2018), cancer will claim an estimated 9.6 million lives worldwide in 2018 and is globally ranked as the second leading cause of premature death. Lung, breast, and colorectal cancer are currently among the top three most common types of cancer (WHO, 2018a). An estimated 57% of new cancer deaths occur in the underserved and underrepresented areas of Central America, Africa, and Asia, and it is

estimated that the number of worldwide annual cancer deaths will increase to 23.6 million by 2030 (National Cancer Institute, 2015).

The number of new cancer cases for 2018 in the United States were estimated to be approximately 1.7 million and the estimates for 2018 cancer deaths are 610,000 (National Cancer Institute, 2015). The National Cancer Institute (2018) reported that the 2017 cost for treating cancer in the United States was $147.3 billion. An accurate assessment of the global economic burden associated with cancer was difficult to obtain due the to the lack of cancer registries in some nations (American Society of Clinical Oncology, 2015). However, the American Society of Clinical Oncology (2015) has estimated the annual worldwide direct costs associated with cancer are $1.16 trillion but the costs rise to $2.5 trillion annually when long-term care and family costs are taken into consideration.

Persons with cancer may experience a poorer QOL primarily because the treatment for the disease often requires that one is administered harsh pharmaceutical regimens and chemotherapy which have toxic effects on the human body (Deshmukh et al., 2014). Quality of life measures for persons with cancer must include functional, physical, and mental health of the patient during and after treatment (Dickerson, Connors, Fayad, & Dean, 2014). While cancer is a NCD, it was not included in this study because the incidence of the disease is not affected by behavioral change and improving HRQOL for persons with cancer is already well studied (Allison et al., 2013; Dehdari et al., 2018; Deshmukh et al., 2014; Dickerson et al., 2014; Guilford et al., 2017; Gunn, Clark, Battaglia, Freund, & Parker, 2014; Hoffman et al., 2012; Hook, Ware, Siler, & Packard,

2012; Hryniuk, Simpson, McGowan, & Carter, 2014). The patient navigation model was originally developed for cancer patients (Freeman & Rodriguez, 2011) and parallels the chronic disease models utilized in this study.

Diabetes. Diabetes Mellitus (DM) classifies a group of diseases that affect the body's ability to process glucose (Mayo Clinic, 2016c). There are a number of different types of diabetes including Type 1, Type 2, and gestational diabetes (American Diabetes Association, 2016). Long-term complications from DM include an increased risk for cardiovascular problems including heart attack or stroke, renal failure, and circulation disorders that can lead to limb loss (Mayo Clinic, 2016c; WHO, 2017). Uncontrolled diabetes results in impairment of multiple organ systems and is a serious global public health threat (WHO, 2017).

Type 1 diabetes affects approximately 5% of the entire diabetes population and generally occurs in children, teens, and young adults (CDC, 2018). The CDC (2018) described Type 1 diabetes as an autoimmune disorder which causes the body to stop producing insulin and persons who are diagnosed with Type 1 diabetes will require insulin daily. Insulin is an endogenous hormone that is secreted by the pancreas so that the body can properly regulate blood glucose levels (American Diabetes Association, 2018). Type 2 diabetes affects approximately 90% of those with the disease (CDC, 2018a). One develops Type 2 diabetes over a period of years and diagnosis usually occurs as an adult (CDC, 2018a). Gestational diabetes occurs in pregnant woman who have not been previously diagnosed with the disease and generally is self-resolving after pregnancy (CDC, 2018a).

The WHO (2017) reported that the number of persons with diabetes globally quadrupled from 1980 to 2014. Four hundred and twenty-two million persons were diagnosed with diabetes as of 2014 and the prevalence of the disease increased precipitously in middle- and low-income nations (WHO, 2017). They also reported that 1.6 million deaths were directly linked to diabetes and that by 2030 the disease will be the seventh leading global cause of premature death. In the United States, 30.3 million persons (9.4% of the population) were diagnosed with diabetes in 2015 and another 84.1 million prediabetes (National Institute of Diabetes and Digestive and Kidney Diseases, 2018). In 2017, 23.1 million persons were diagnosed with diabetes and 7.2 million people are at risk for diabetes (CDC, 2017). Diabetes is the seventh leading cause of death in the United States and the total direct and indirect treatment costs associated with the disease was $245 billion in 2012 (CDC, 2018). In 2014, 7.2 million hospital discharges were attributed to diabetes and associated complications and of these,.5 million persons had been discharged due to a comorbid CVD condition, 108,000 persons required lower limb amputation, and 168,000 suffered from diabetic ketoacidosis (CDC, 2017). Diabetes diagnoses were related to 142 million emergency department visits were reported in 2014 (CDC, 2018).

The quality of life for persons with diabetes varies. If a person with diabetes can effectively manage their disease by monitoring their diet, taking required medications, and remaining active, they can lead a quality life (Lin et al., 2017). For some, the disease management is complicated and overwhelming which can decrease HRQOL (Lin et al., 2017). Without close management, diabetes frequently leads to both long- and short-term

complications, some of which require hospitalization and lead to (MCC) (Lin et al., 2017). Some of the factors that have been found to be related to difficulties managing diabetes include:

- Smoking: Fifteen point nine million persons with diabetes currently smoke and smokers are 30 to 40% more likely to develop diabetes than nonsmokers (CDC, 2018). Smokers are more likely to require insulin for glucose control, whereas nonsmokers are more successful in managing their glucose levels by diet alone (CDC, 2018).
- Excess weight: Weight is a factor that has been found to be highly associated with diabetes and 87.5% of those with diabetes are considered overweight or obese. This independent risk factor increases the likelihood of developing diabetes and is directly related to physical inactivity and diet (Hamilton, 2013).
- Physical Inactivity: The WHO (2015) reported that physical inactivity was an increasing global problem due to the sedentary nature of many work and home environments as 40.8% of those with diabetes are considered inactive. They also reported that one-third of adults and two thirds of adolescents do not engage in sufficient physical activity to maintain healthy lifestyles.
- Hypertension (high blood pressure): Hypertension among person with diabetes (73.6%) is related to cardiovascular and renal disease (de Boer et al., 2017).

Respiratory disease. Respiratory diseases include asthma, chronic obstructive pulmonary disease (COPD), and other respiratory ailments (Sommer et al., 2015). COPD is an irreversible, progressive condition requiring frequent hospitalizations and decrease quality of life (Memon, 2017). COPD is a chronic inflammatory condition of the lungs, which causes decreased airflow. Long-term complications from COPD include respiratory infections, CVD, cancer, and pulmonary hypertension (Mayo Clinic, 2016b). The primary cause of COPD has been determined to be exposure to primary or secondary cigarette smoke but can also be caused by pollution and lifelong asthmatic conditions (WHO, 2017).

COPD is among the world's top diseases that lead to death and disability. Approximately 3.2 million persons died from COPD worldwide in 2015, which was an increase of 11.6% since 1990 (Abajobir et al., 2017). COPD claimed 3.17 million lives in 2015 and 90% of the COPD deaths occurred in low- and middle-income countries (WHO, 2017). In 2016, 251 million cases of COPD were reported worldwide (WHO, 2017). In the United States, COPD was ranked as the fourth leading cause of death in 2016 and 15.5 million individuals are diagnosed with the disease annually (Croft, 2018).

The primary risk factors associated with the disease are airborne exposure to tobacco smoke, pollutants, and respiratory infections (Croft, 2018). Persons who are diagnosed with COPD at an early stage are more likely to have more favorable outcomes, and if treated properly those persons may reduce their risk of hospitalization or death (Croft, 2018). Approximately 12 million adults in the United States have been diagnosed with COPD and it is estimated that another 12 million remain undiagnosed (National

Institutes of Health, 2018). According to the National Institutes of Health (2018), 120,000 persons die from COPD annually in the United States.

Mobile Integrated Healthcare-Community Paramedicine (MIH-CP)

By leveraging a cadre of specially trained EMS personnel, MIH-CP programs were built to fill in gaps in local healthcare delivery (Siddle et al., 2018a). Siddle et al. (2018) report that shortages of physicians and nurses drive persons to seek care wherever possible and all too often this is the hospital ED. MIH-CP is an in-home intervention tailored to those who require out-of-hospital acute care for chronic conditions.

Since the implementation of the Patient Protection and Affordable Care Act, a trending paradigm shift is to make patient care more centric and efficient; thus innovative designs are fast-tracked and financially incentivized (Clarke, Bourn, Skoufalos, Beck, & Castillo, 2017). MIH-CP is an emerging model which closes the care gaps and shifts the paradigm longitudinally. In 2016, it was reported that the United States Department of Health and Human Services Center for Medicare and Medicaid Services (CMS) funded a literature review to determine the safety and effectiveness of allowing EMS personnel to determine the appropriate treatments and settings for persons to receive care (Iezzoni, Dorner, & Toyin, 2016). The researchers reported that the EMS system could provide such care and that MIH-CP could offer relief for an already overburdened national healthcare system (Iezzoni et al., 2016).

The Longitudinal Care Plan is patient-centered and relies on collaboration among healthcare professionals (Dykes et al., 2014). Disease prevention, education, and patient-family engagement are cornerstones of the Longitudinal Care Plan. Members of the

MIH-CP are considered part of the patient care team and are responsible for working with other team members and stakeholders. The longitudinal care concept is not new, but similar to MIH-CP, lack of clarity, regulation, and standards caused it to be overlooked and undervalued.

Mobile Integrated Healthcare (MIH-CP). The research partner organization introduced its MIH-CP services in 2009 to primarily address inappropriate use of local EDs (Nejtek et al., 2017). According to the PD (2016), the organization's MIH-CP program is an 'intervention' that consists of health education, case management, and home health services. While available to anyone, the focus of the program is on frequent and high utilizers who misuse the ED (Zavadsky, 2016). The PD (2016) reported that the program is also available for persons with multiple uncontrolled NCDs. The organization's Paramedics have received advanced training to provide integrated, collaborative healthcare with various agencies and clinicians ; PD (2016) advised that the MIH-CP patients are enrolled for a 30- or 60-day program depending on the specific illness, and during this time, patients will receive daily telephone calls from the MIH-CP team and three scheduled MIH-CP home visits per week. PC, (2016) indicated that MIH-CP enrollees also have access to after-hours MIH-CP support through on-call Critical Care Paramedics who are dispatched by an organization triage nurse based in the 911 center.

MIH-CP is not only being used in the southern United States. As of 2016, there were over 250 operational MIH-CP programs throughout the United States, Canada, and Europe (Zavadsky & Hooten, 2016). These programs are operating with the common

goal of reducing EMS utilization, reducing unnecessary hospitalizations, and improving the patient experience. In Wilmington North Carolina, New Hanover Regional Medical Center delivers MIH-CP services under the CP label (Glendenning & Jones, 2015). Glendenning & Jones (2015) cited that the key factors to the New Hanover Regional Medical Center success are, (a) Education and experience, (b) Portable technology, (c) hospital to home, home to hospital patient-centered focus, (d) partnering with payers.

The Reno Emergency Medical Service Authority uses an approach similar to the research partner and received a CMS Healthcare Innovation award for their aim of reducing total patient care expenditures by $10.5 billion over three years (Zavadsky, Hagen, et al., 2015). According to Zavadsky et al. (2015), the goal of the MIH-CP is to bridge the gap from discharge to follow up with a medical professional. Closing this gap keeps patients from falling through the cracks and requiring re-hospitalization. The financial detriment to hospitals for extended stays and high readmission rates is significant and MIH-CP can potentially yield cost savings for other stakeholders in the healthcare system (Zavadsky, Hagen, et al., 2015).

Emergency medicine physicians in Canada consider MIH-CPs vital to their nations' healthcare system (Bigham & Welsford, 2015). Evidence-based medicine (EBM) has caused a culture shift among the medical community. Governmental authorities and third-party payers are seeking to deliver high-quality, affordable, healthcare, and they are actively seeking innovative approaches to change the status quo. Emergency medicine has embraced EBM and considers the paramedic scope of practice as fluid due to the ever-changing healthcare environment.

EBM is increasingly expected to show that specific interventions are both valuable and worth the cost of providing them. MIH-CP programs must be able to measure specific patient outcomes and demonstrate patient satisfaction to show value, but data collection among MIH-CP providers varies The National Association of Emergency Medical Technicians (2015) reported that 90% of the MIH-CP programs in the United States collected data on program effectiveness and that MIH-CP programs who were in operation for two years or longer were successful in reducing costs, unnecessary 911 use, and reduced ED visits for specific groups of patients (i.e. heart failure).

MIH-CP has also moved beyond the borders of the United States. Since 2005, representatives from Australia, Canada, England, Germany, Ireland, Israel, Norway, Switzerland and the United Arab Emirates have participated with U. S. providers to create the International Roundtable of Community Paramedicine (Wingrove et al., 2015). The Australian government provided $4 million to fund five site trials in four states and territories (Wingrove et al., 2015). Nolan et al. (2015) reported that the Australian program works closely with existing healthcare providers but in more remote locations patients are connected directly to MIH-CP providers via a smartphone app. The Canadian healthcare system has been highly innovative in creating many MIH-CP programs that are tailored to the needs of the community (Wingrove et al., 2015). The Canadian programs offer wide-ranging services from community needs assessments, to elder care, and home-based critical care (Wingrove et al., 2015). Data from the other roundtable member nations have not yet been published.

Summary and Conclusions

The demonstration of MIH-CP as a CDM intervention may have an important impact on care delivery for persons with NCDs. MIH-CP requires a partnership between many stakeholders (patients, hospitals, physicians, home health agencies, government, payers, and other ancillary health entities) (Zavadsky & Hooten, 2016). The research partner organization's MIH-CP program is considered to be one of the best programs in the United States (Iezzoni et al., 2016). In 2016, I was invited to visit the organization for a 5-day ride along with their MIH-CP teams. During this visit, I made first-hand observations of how their program works, what drives their success, and how they measure patient outcomes and satisfaction.

Understanding NCDs and the driving forces behind emerging CDM models is critically important for achieving success in mitigating this global health crisis. Illuminated in this chapter are historical data pertinent to the NCD epidemic, basic definitions of NCD, patient and provider attitudes toward disease, and the theoretical framework of self-management. Also discussed is the evolving MIH-CP model that will be the focus of the proposed research.

The body of evidence on NCD and traditional CDM approaches is very robust and easily researched. The same cannot be said for emerging CDM models. Innovation in CDM is fragmented and may not include using nontraditional healthcare extenders in their efforts. The MIH-CP model is still a budding concept, so the body of evidence is far from comprehensive. Many MIH-CP programs are still in a pilot phase, and the published information is either absent, scarce, or non-peer-reviewed. The dearth of MIH-

CP data supports additional research to determine what relationship, if any, may exist in engaging the concept in CDM and improved HRQOL.

The next chapter contains a comprehensive review of the research method. The review discusses the research design and the rationale for its use in this study. Also discussed is the study population and sampling methods, as well as the population and data collection methods.

Chapter 3: Research Method

Introduction

The purpose of this quantitative study was to investigate the relationship between NCD type (i.e., cardiovascular conditions, chronic respiratory disease, cancers, and diabetes), age, gender, duration of participation in MIH-CP, hospital readmission, and self-reported perceived QOL as measured by the EQ-5D-3L for those who received services from the MIH-CP program. MIH-CP is a specially designed, home-based program that assists persons in managing various NCDs with treatment, testing, and counseling for a specified period of time (Zavadsky & Hooten, 2016). MIH-CP programs can be customized by engaging a variety of healthcare providers, such as EMTs, EMT-Ps, registered nurse practitioners, and physicians' assistants (Zavadsky & Hooten, 2016).

Chapter 3 is divided into four sections. In the first section, I summarize the research design and the rationale for using this design. The second section includes a detailed explanation of the research methodology. In the third section, I identify the threats to validity, and in the fourth section, summarize the chapter.

Research Design and Rationale

The independent variables for this study were NCD type, age, gender, duration of participation in MIH-CP, and hospital readmission (all related to Research Questions 1, 2, and 4). There were three dependent variables for this study. The first dependent variable was the patient's self-perceived QOL prior to the MIH-CP intervention program as measured by the EQ-5D-3L (related to Research Question 1). The second dependent

variable was the patient's self-perceived QOL after the MIH-CP intervention program as measured by the EQ-5D-3L (related to Research Question 2). The third dependent variable was the calculated difference in the patient's self-reported QOL between the pretest and posttest scores (related to Research Questions 3 and 4).

Research Design

The research design that I used for this study was a pretest/posttest design using secondary data where the organization providing the data implemented the intervention. I selected this type of research design because it is commonly used in healthcare settings and because the design would support or contest the hypothesis of this study (see Baraz et al., 2017; Chapman, 2018; Jacome & Marques, 2014; Naseer et al., 2017; Wittig-Wells et al., 2015). When comparing the measurable difference between the pretest and posttest scores, it could be potentially inferred that the process of going through MIH-CP was the reason that the score between the pretest and posttest changed; although, causation cannot be completely established (see Frankfort-Nachmias & Nachmias, 2008b). Because the research partner organization has been collecting pretest and posttest data with the EQ-5D-3L, it was possible to utilize this type of study design without having to administer the intervention, which was an advantage as the data were readily accessible for study (see Allen, 2017).

Campbell and Stanley (1963) reported that one-group pretest-posttest experimental designs are weak and highly invalid with true experiments. Considering the safety features of this design, I was comfortable that it would be able to answer the research questions as long as I considered the limitations of the design when analyzing

the data, interpreting the results, and attempting to generalize the findings of the study. Despite the weakness of the design, the pretest-posttest design is useful for research involving instructional interventions, and MIH-CP involves patient education (see Campbell & Stanley, 1963). For this study, the MIH-CP intervention that was administered by a research partner organization, and when measuring a change in the dependent variable, the pretest-posttest design is a reasonable choice (see Campbell & Stanley, 1963).

Knapp (2016) reported that the pretest-posttest design continues to be popular in clinical healthcare research. While Campbell and Stanley (1963) demonstrated that the pretest-posttest design was an inferior research design, Knapp questioned why the design has endured over 50 years of scrutiny if it was not useful to researchers and disciplines. Some of the reasons for the survival of the design include minimizing time and research expenses, the simplicity for the design for novice researchers, and the ability of the design to study relationships between variables instead of causality (Knapp, 2016). Knapp also identified that it is easier for some to critique a design that may be overused rather than to engage in the difficult task of directly addressing any problems with the research design.

The pretest-posttest design is a good choice when conducting research on interventions that impact quality of life (Abbasi et al., 2018; Bullen et al., 2018; Emerson et al., 2016; Gogia & Begum, 2018). When studying research on intervention programs, it is not uncommon to find the pretest-posttest design (Alessandri, Zuffianò, & Perinelli, 2017). Another realm of healthcare research involving a pretest-posttest design is in the

area of pilot studies, which are used to identify if programs need to be altered before moving to full implementation (Martínez-Martínez et al., 2017). Since the MIH-CP intervention is still being piloted throughout many regions of the United States (Choi et al., 2016), a pretest-posttest design also seemed reasonable for this study.

It was necessary for me to examine other research designs to determine which would be best suited for addressing the research questions of this study. A changing criterion design (CCD) was also considered for this investigation, but I could not align my research questions and hypotheses with this type of design. Hartman and Hall (1976) discussed how the CCD provided researcher control while permitting initial baseline assessments and implementation of a phased treatment program targeting a change in behavior, followed by a concluding assessment. The rationale for considering a CCD inquiry was to consider MIH-CP as the phased intervention. Since the intervention was performed by another entity, I could not ensure that the CCD controls were in place (see Hartmann & Hall, 1976). McDaniel and Bruhn (2016) used the CCD when studying the behavioral changes that were associated with an intervention program. The MIH-CP intervention has the capacity to cause participants to engage in healthier behaviors that might influence their NCDs (Zavadsky, 2016). One of the first applications of the CCD involved behavioral self-management research (McDougall, 2005). Since my study used the theoretical framework of the HBM, the CCD remained a viable option to me until I reaffirmed that the design would be misaligned with my research questions. However, this type of design may be useful if I continue my scientific inquiries in the future.

Another research design consideration for this study was the single-case experimental design (SCED). The SCED design uses participants to serve as their own control group for comparison between two phases in time (Lane et al., 2017). SCED research designs are best suited for examining the effectiveness of interventions and are widely used in health, education, and psychology fields where processes and outcomes of behavioral interventions are studied (see Schemer et al., 2018; Schlosser, Belfiore, Sigafoos, Briesch, & Wendt, 2018; J. D. Smith, 2012). Experimental controls could not be assured and alignment problems with my research questions and hypotheses caused me to reject consideration of this design.

Other research designs were immediately ruled out due to the nature of this study. Qualitative and mixed method designs were inappropriate for this study and were not employed. Since qualitative methods do not require the manipulation of variables to identify the effectiveness of an intervention, they were not suitable for this investigation. Furthermore, qualitative methods center on subjective data collection through observational and interview methodologies (Frankfort-Nachmias & Nachmias, 2008b). Since the mixed-method research design combines both quantitative and qualitative inquiry, I deemed it inappropriate because no qualitative data had been collected and incorporated into the data set that was provided to me by the organization and, therefore, was not available for analysis. However, analysis of patient records (i.e., qualitative data) in relation to the available quantitative data would be a recommendation for future research.

Methodology

Population

The research partner organization's MIH-CP initiative was the intervention studied, and the organization provided the pretest-posttest data from the EQ-5D-3L surveys for participants who received the MIH-CP intervention. The organization is the exclusive emergency and nonemergency ambulance service provider to a 15 county region in the southern region of the United States. The organization provides advanced life support ambulance service over 434 square miles, to more than 980,000 residents in the county they serve, and responds to about 135,000 emergency calls a year with a fleet of 57 ambulances (Nejtek & Talari, 2016). I selected my research partner for this study because the organization has had a MIH-CP program in place since 2009 and was recognized as a national leader in MIH (Zavadsky, Hagen, et al., 2015). The agreement on collaboration with the research partner organization for this current study and the agreement to access data are provided in Appendix A.

I contacted my partner organization multiple times throughout conceptualization of this study (i.e., 01/20/2017, 06/23/2017, 01/15/2018, 07/11/2018) and again in late December 2018 to verify how many individuals complete the MIH-CP program each year and to ascertain if the EQ-5D-3L was still being utilized to assess QOL both pre- and post-MIH-CP enrollment and graduation. The PD (2018) reported that the MIH-CP program has steadily increased in participation numbers since 2009 and that the 2018 enrollment-graduation participation was estimated to continue to increase in number. In 2016, the organization's MIH-CP program enrolled and graduated approximately 724

participants (Coffman & LaFrance, 2016). The research partner organization has consistently used, and continues to use, the EQ-5D-3L survey instrument both pre- and post-MIH-CP enrollment and graduation.

Sampling and Sample Procedures

Sampling strategy. I used a purposive, convenience sampling method as the sampling strategy for this study. The use of purposive, convenience sampling is facilitated by ease of access to the participants and because there are no predetermined variables (Creswell & Creswell, 2018). The sampling frame is comprised of sampling units that appear to be representative of the population and subjective in nature (Creswell & Creswell, 2018; Frankfort-Nachmias & Nachmias, 2008b). I based my decision to conduct an analysis of the research partner organization's MIH-CP data on the organization being the only MIH-CP program in the United States that captured data relevant to this study and that used an instrument that measured HRQOL (see Nejtek et al., 2017).

Purposive sampling is a nonprobability sampling method that can be appropriate when a study requires that participants have a certain knowledge base and/or participated in a specific program (Lavrakas, 2008). In the case of this study, data were from individuals who had a NCD, were 18 years or older at time of treatment, and participated/graduated from the MIH-CP program administered by the partner organization (other inclusion and exclusion criteria are explained below). Convenience sampling means that the data are conveniently accessible for the study (Lavrakas, 2008), which they were because the data were considered part of the day-to-day operations of

the partner organization. Since the research partner collected the data needed for this study as a part of their day-to-day operations and were willing to provide me with the data from cases where participants met the inclusion criteria for the study, the sampling method employed was convenience sampling.

On December 1 2014, researchers at a regional university were awarded a program evaluation grant by the research partner organization to conduct a program effectiveness study of the MIH-CP program (Nejtek & Talari, 2016). Due to limited funding and time constraints, the researchers conducted their analysis for the program evaluation using only two groups of patients; the high utilizer group (HUG) and the congestive heart failure group (Nejtek & Talari, 2016; Zavadsky, 2016). While the university research was solely focused on program effectiveness, the researchers and the organization agreed upon an inclusion and exclusion criteria that was well aligned to the research design, research questions, and hypotheses that I studied. In 2016, researchers at the University of California San Francisco identified that MIH-CP programs were a potential resource persons who were at risk for needing long-term care for chronic conditions (Coffman & LaFrance, 2016). The University of California San Francisco study contained information from four MIH-CP programs in the United States, including the research partner organization's program. After reviewing their research, I determined that the previously established inclusion and exclusion criteria were appropriate for my research since these criteria focus the research on those persons with NCDs who require frequently hospitalization, unnecessary emergency medical transportation, and unnecessary ED treatment.

Cases of data that would be included in the dataset from research partner organization need to meet the following criteria:

1. Those accepted in the organization's MIH-CP.
2. 18 years or older at the time of treatment by the organization
3. Diagnosed with a NCD category included in this study (cardiovascular conditions, chronic respiratory disease, cancers, and diabetes).
4. Graduated/completed the organization's MIH-CP program.
5. Information for at least 75% of the variables being analyzed included for the case in the data set (to limit the issues with missing variables/values in analyses.
6. Both pretest and posttest scores for the EQ-5D-3L were included in the data case.

Cases were excluded from the dataset of they did not meet all of the above inclusion criteria.

Power analysis. A power analysis calculation was performed to determine the sample size required for this study. Cohen (1988) suggested that a medium effect size should be .50 while a large effect size should be .80. Multiple linear regression analyses and paired sample *t* tests were the preferred statistical tests for this study as they would show the quality of life perceptions of MIH-CP participants both pretest-posttest. McGough and Faraone (2009) suggested that the effect size statistics provide a far better estimate of treatment effects than *p* values alone, and that clinical implications with small effect sizes have far greater clinical consequence than those studies with large effect

sizes. Kim (2015) suggested that level of significance values should be revised to 0.005 or 0.001 to increase the probability of detecting strong to very strong evidence while simultaneously reducing the Type I error rate.

The paired sample *t* tests power calculation was made by the G*Power (version 3.1) software using the following parameters:

1. Test family- *t* tests
2. Statistical test- Means: Difference between two dependent means (matched pairs)
3. Type of analysis- A priori: Compute required sample size- given α, power, and effect size
4. Input parameters- Two tailed, effect size 0.2, α err prob. 0.05, Power 0.95
5. Total sample size required- 327

The multiple regression power calculation was made by the G*Power (version 3.1) software using the following parameters (Faul, Erdfelder, Buchner, & Lang, 2009):

1. Test family- f tests
2. Statistical test- Linear regression: Fixed mode, R^2 increase
3. Type of analysis- A priori: Compute required sample size- given α, power, and effect size
4. Input parameters- effect size 0.1, α err prob. 0.05, Power 0.95
5. Predictors- multiple tests run 2/5 through 5/5 (number tested/total)

To conduct all required statistical testing, the highest sample size requirement of 327 was used for this study.

Procedures for Data Collection

MIH-CP data collection procedures. The research partner organization is an active member of the region's hospital council foundation. In 2012, it was reported by the foundation that in one county alone (research partner service area) that approximately 56% of all ED visits were for non-emergent reasons and accounted for nearly $2 billion in charges (Nejtek & Talari, 2016). PD (2016) reported that MIH-CP program was introduced in 2009 to mitigate inappropriate emergency department use and that referrals to the organization's MIH-CP program primarily originate from the discharging hospital. Program director (PD) and program coordinator (PC) acronyms were used to protect the identity of my research partner and its employees. During my site visit, PD and PC (2016) reported that the organization is contacted by a hospital social worker within 24 hours of a patient discharge that a patient may be eligible for the MIH-CP program. It was the responsibility of partner organization to evaluate the patient based on the inclusion and exclusion criteria to determine of MIH-CP is appropriate (PC, 2016; PD, 2016). Patients who met the inclusion criteria were then invited to participate in the program.

Patients who accepted the organization's MIH-CP program invitation were contacted by an MIH-CP staff member who scheduled an initial home visit with the patient to explain the MIH-CP program and obtained the patient's consent to participate. Upon obtaining written consent from the participant, an organization MIH-CP employee administered a baseline QoL assessment using the EQ-5D-3L survey instrument. The partner organization's MIH-CP staff then inputed the baseline QoL data into the patient's

electronic health record (EHR). Upon graduation from the MIH-CP program, the partner organization's MIH-CP employee administered a discharge QOL assessment using the same EQ-5D-3L survey instrument and those data were also entered into the patient's EHR.

The research partner organization provided the MIH-CP intervention (PC, 2016; PD, 2016). Participants who received the MIH-CP intervention were recruited by the organization based on the following inclusion and exclusion criteria.

Those residing in a metropolitan community who were urban city residents. Eligible participants were required to have:

1. Been transported to the ED ≥ four times within a 1-year period during 2013–2015 seeking treatment for a nonemergent or emergent treatable primary care condition
2. The mental capacity to follow medical advice
3. The willingness to engage in navigational assistance
4. The ability to proactively seek health resources outside the ED

Participants were excluded if they were:

1. Pregnant
2. Receiving chemotherapy or radiation for active malignancies
3. Younger than 18-years old
4. Homeless without shelter
5. Lacking mental capacity to understand disease management
6. Unwilling to allow MIH team members to enter their home

7. Unwilling to be linked to a medical home physician or clinic
8. Actively abusing substances with no intent to abstain
9. Deemed ineligible by the EMS agency medical director

The partner organization employs specially trained EMS providers who administered the MIH-CP intervention (program) over a 30- or 60-day period depending on the nature of the chronic condition and the patient's status upon discharge from a local medical facility. The organization was notified by the discharging facility that a MIH-CP candidate needed to be screened for possible enrollment in the program. Patients who met the inclusion criteria were asked if they would like to enroll in the MIH-CP program as a participant and if they choose to participate, they were enrolled for either a 30- or 60-day period. The acuity of the patient's chronic condition was the determining factor for the length of enrollment. During the enrollment period, participants were routinely visited by a member of the MIH-CP program three times per week. The initial visit was a screening visit where the organization's MIH-CP personnel assessed the individual health needs of each patient and administered the initial (pretest) EQ-5D-3L quality of life survey via personal interview.

After the initial visit, the MIH-CP developed an individualized treatment plan for each patient after consulting with the patient's healthcare team (primary care physician, specialists, pharmacy, etc.). The patient was seen three times weekly but could contact an on-call MIH-CP member 24 hours per day if a more urgent, but not emergent, health issue arose. During the period of enrollment, the patient was educated on how to care for their chronic condition and how to make lifestyle changes that may improve their quality

of life. Participants were considered to be graduated from the MIH-CP program after the 30- or 60-day enrollment. During the last MIH-CP visit, the organization's MIH-CP staff administered the discharge (posttest) EQ-5D-3L quality of life survey. Once a patient has graduated from the MIH-CP program, the organization would no longer follow the patient on a routine basis, nor would they continue to assess their QOL. Patients can be reenrolled in the MIH-CP program if another hospitalization and discharge occurred.

Secondary data attainment. During my 2016 site visit to the research partner organization, I obtained a verbal commitment from chief strategic integration officer that the organization would serve as my research partner for this study. This commitment was reaffirmed in October 2018 during a telephone conference with organization executives. On January 27, 2019 I received a letter from organization confirming their participation. In accordance with direction from the Walden University IRB (November 13, 2019 email), the letter was removed from this study for masking purposes. A copy of the letter is on file with the Walden University IRB. Upon approval from the Walden University IRB, the partner organization provided data on the included variables used for this study. I was responsible for providing the partner organization with my IRB approval notification before they released the data to me. The data did not contain any personally identifiable patient information and was codified by a unique electronic health record identifier assigned by the partner organization. The organization only supplied data for patients who met their inclusion/exclusion criteria and completed the MIH-CP program.

Instrumentation and Operationalization of Constructs

Instrumentation. The (EQ-5D-3L; (Euroqual Research Foundation, 2019) is an instrument used by the partner organization to collect data that were used for this study. While I did not collect data directly from participants, the partner organization's MIH-CP program collected data on patient self-reported perceived quality of life with the EQ-5D-3L. The EQ-5D survey (see Appendix B) is an instrument that specifically designed to measure (HRQOL;(Roset, Badia, & Mayo, 1999). The partner organization collected the data via the self-complete, paper version or the face-to-face interview version of EQ-5D-3L (PC, 2016). The EQ-5D-3L consists of two pages - the EQ-5 descriptive system (page 2) and the EQ visual analogue scale (EQ VAS; page 3). The EQ-5-3L contains the five-dimensional scales of mobility, self-care, usual activities, pain/discomfort and anxiety/depression. Each dimension has three levels; no problems, some problems, extreme problems (Euroqual Research Foundation, 2019). Each respondent was asked to indicate his or her health status by checking a box against the most appropriate statement in each of the five dimensions. The EQ VAS uses a vertical, visual analog scale from 0-100; endpoint 0= "worst imaginable health and endpoint 100= best imaginable health." The descriptive system of the EQ-5D-3L can be converted into singular summary index through a weighting calculation formula methodology and the EQ-VAS can also be converted to a singular score (mean) using time trade-off valuation (Euroqual Research Foundation, 2019). The partner organization has already converted the data to a singular summary score using the methods described in the EuroQual manual (PC, 2016; Van Reenen & Oppe, 2015).

Instrument reliability and validity. The EQ-5D-3L was developed and introduced by the EuroQol Group in 1990 as an instrument to assess self-perceived QOL (Euroqual Research Foundation, 2017). The EQ-5D-3L is deemed a multiattribute utility instrument (Wisløff et al., 2014). Wisloff et. al, (2014) measured the EQ-5D-3L against several other QOL instruments and found the EQ-5D-3L to be superior in reporting the transparency of QOL. EQ-5D-3L uses a five-dimension descriptive system of measuring mobility, self-care, usual activities, pain/discomfort, and anxiety/depression and also includes a vertical analogue scale (VAS) for patient's to self-rate their quality of life from the worst imaginable state to the best imaginable state (0-100 scale; (Euroqual Research Foundation, 2017). EQ-5D-3L is available in 170 languages and multiple administration modes (Euroqual Research Foundation, 2017) and is recognized by the U.S. Department of Health and Human Services, Agency for Healthcare Research and Quality as a valid and cost-effective instrument to assess a patient's self-perceived quality of life (Agency for Healthcare Research and Quality, 2018). EQ-5D-3L remains widely used in studies that evaluate persons' quality of life (Brussoni, Kruse, & Walker, 2013; Euroqual Research Foundation, 2017; Evans, Dattani, Ramasamy, & Patel, 2018; Fang et al., 2016; Golicki et al., 2015; Janssen et al., 2013; Kim, Jo, Lee, Lee, & Kim, 2015; Pattanaphesaj & Thavorncharoensap, 2015; Wisløff et al., 2014).

Operationalization. Table 1 contains the variable information for each of the research questions, how they were measured, and values that were assigned in the data set.

Table 1

Independent and Dependent Variable Operationalization

Research Question(s)	Variable Name	Variable Type	Coding used by researcher (original data from organization will be recoded)
1, 2, 4	Non-communicable Disease (NCD)	IV	0=Cardiovascular 1=Chronic Respiratory 2=Cancer 3=Diabetes
	Age	IV	Actual age in years
	Gender	IV	0=male 1=female
	Duration of time in MIH-CP program	IV	Actual number of days in program
	Hospital readmission	IV	0=no 1=yes
3	Pre-test score: Self-reported perceived quality of life as measured by EQ-5D-3L <u>before entering</u> the Mobile Integrated Healthcare program	Variable 1	Converted single score: visual analog scale from 0-100; endpoint 0= worst imaginable health and endpoint 100= best imaginable health
	Post-test score: Self-reported perceived quality of life as measured by EQ-5D-3L <u>after completing</u> the Mobile Integrated Healthcare program	Variable 2	
4	Calculated difference in scores of self-reported perceived quality of life as measured by EQ-5D-3L ***before entering*** the Mobile Integrated Healthcare program and ***after completing*** the Mobile Integrated Healthcare program	DV	Converted single score: visual analog scale from 0-100; endpoint 0= worst imaginable health and endpoint 100= best imaginable health

Data Analysis Plan

SPSS (Version 25) software was used for all data analyses. The partner organization administered the pretest and posttest EQ-5D-3L via face-to-face interview with participants who met the inclusion/exclusion criteria for their organization. Data for the current study was shared with the student after obtaining Walden University IRB approval. The data were imported into SPSS for analysis. The data was analyzed for any inconsistences such as missing data and was modified so that analyses of data could only be performed on complete pretest and posttest EQ-5D-3L surveys. Data cleansing goes beyond identifying errors and since repairing errors often leads to time-consuming fixes that lead to new errors it is best to redact them from analysis (Peng, Wang, Ding, Xiao, & Liu, 2017).

Descriptives. Following data cleaning, descriptive statistics were analyzed. Multiple linear regression was used to examine the independent variables (NCD type, age, gender, duration of time in the MIH-CP program, and hospital readmission) and their relationship to the dependent variable (self-reported QOL before/after entering the MIH-CP program). The data were verified to ensure that the assumptions for the test were met to include independence, homogeneity of variance, linearity, and a normal distribution of data in both of the samples. Demographics were analyzed with descriptive statistics and frequency distributions where appropriate.

Independent *t* tests. Independent sample *t* test analyses were conducted in order to provide additional information about the sample and differences in dependent variables means based on groups within independent variables (Creswell & Creswell, 2018; Field,

2013). Independent *t* test analyses have demonstrated their usefulness when looking at the differences in the means of dependent variables among groups within independent variables (Matthews et al., 2018; Ptomey et al., 2018; Seghatoleslami, Hemmati Afif, Irandoust, & Taheri, 2018). For the purpose of these analyses, the following independent variables were recoded into binary values/groups and comparisons of the dependent variable made between those groups. While not used to answer the research questions above this process will provide additional information about the sample. The dependent variables that will be used for these independent *t*-Test analyses include pretest score on the EQ-5D-3L, posttest score on the EQ-5D-3L, and calculated differences in pretest/posttest EQ-5D-3L scores. For the purpose of these analyses, the following independent variables will be recoded into binary values/groups and comparisons of the dependent variable made between those groups (see Table 2).

Table 2

Independent Sample t Test *Recoding*

Variable Name	Initial Coding used by researcher (original data from organization will be recoded)	*t*-Test Recoding
Non-communicable Disease (NCD)	0 = Cardiovascular 1 = Chronic Respiratory 2 = Cancer 3 = Diabetes	0 = Cardiovascular/Respiratory 1 = Cancer/Diabetes
Gender	0 = male 1 = female	0 = male 1 = female
Duration of time in MIH-CP program	Actual number of days in program	0 =< 100 days 1 => 100 days
Hospital readmission	0 = no 1 = yes	0 = no 1 = yes

While not used to answer the research questions above, this process provided additional information about the sample. The dependent variables that were used for these paired *t* test analyses included pretest score on the EQ-5D-3L, posttest score on the EQ-5D-3L, and calculated differences in pretest/posttest EQ-5D-3L scores.

Multiple Linear Regression (RQ 1, 2, 4)

Multiple linear regression analyses were conducted to address the research questions in this study. With regard to research questions, correlation analysis and regression analyses are quite similar in their basic principles but are intended to answer questions much differently (Tripepi, Jager, Dekker, & Zoccali, 2008). Correlational analyses will first be conducted to determine if multicollinearity is a factor for the multiple regressions analyses (Bagya-Lakshmi, Gallo, & Srinivasan, 2018). Bagya-Lakshmi et al. (2018) reported that multicollinearity poses problems when conducting linear regression analyses because strong linear relationships between explanatory variables may exist and void the notion of true independence. Bagya-Lakshmi et al. suggested using ridge regression stabilizing calculations to obtain a smaller mean squared error criterion.

Multiple linear regression analysis permits testing on the relationship between multiple independent variables and a dependent variable (Creswell & Creswell, 2018; Field, 2013; Tripepi et al., 2008). Multiple linear regression testing was employed to test the null hypotheses related to Research Questions 1, 2, and 4. Statistical testing was used to determine if an observed difference is caused by a random chance or by a true effect of treatment but *p* values can also represent a probability that an error occurred (Ferrill,

Brown, & Kyle, 2010). Ferrill et al. (2010) reiterated that the standard *p* value which demonstrates statistical significance is ≤ .05 and that if *p* values are not listed that the reader should presume that the value is set at the accepted standard of ≤ .05.

Due to the hierarchical nature of the data, a multivariate, multi-level linear regression model was be appropriate (Field, 2013). Field (2013) suggested that a stepwise model, while useful, should be cross-validated for an overfit. The model summary and analysis of variance (ANOVA) tests within SPSS, combined with evaluating the difference between the R2 value and the adjusted R2 value, can be used to determine the goodness of fit for the regression model (de Guzman et al., 2013; Field, 2013).

Paired sample *t* test (RQ 3)

Paired sample *t* test analyses have demonstrated their usefulness when looking at the differences in the means of dependent variables among groups within independent variables when pretest posttest designs have been employed in healthcare research (Matthews et al., 2018; Ptomey et al., 2018; Seghatoleslami et al., 2018). The variables that were used for these paired sample *t* test analyses included pretest score on the EQ-5D-3L and the posttest score on the EQ-5D-3L.

Research Questions and Hypotheses

RQ1: What is the relationship between NCD type (i.e., cardiovascular conditions, chronic respiratory disease, cancers, and diabetes), age, gender, duration of participation in MIH-CP, hospital readmission, and self-reported perceived QOL as measured by EQ-5D-3L before entering the MIH program?

$H_0$1: There is no statistically significant relationship between NCD type (i.e., cardiovascular conditions, chronic respiratory disease, cancers, and diabetes), age, gender, duration of participation in MIH-CP, hospital readmission, and self-reported perceived QOL as measured by EQ-5D-3L before entering the MIH program.

H_A1: There is a statistically significant relationship between NCD type (i.e., cardiovascular conditions, chronic respiratory disease, cancers, and diabetes), age, gender, duration of participation in MIH-CP, hospital readmission, and self-reported perceived QOL as measured by EQ-5D-3L before entering the MIH program.

Research Question 2 (RQ2):

RQ2: What is the relationship between NCD type (i.e., cardiovascular conditions, chronic respiratory disease, cancers, and diabetes), age, gender, duration of participation in MIH-CP, hospital readmission, and self-reported perceived QOL as measured by EQ-5D-3L after completing the MIH program?

$H_0$2: There is no statistically significant relationship between NCD type (i.e., cardiovascular conditions, chronic respiratory disease, cancers, and diabetes), age, gender, duration of participation in MIH-CP, hospital readmission, and self-reported perceived QOL as measured by EQ-5D-3L after completing the MIH program.

H_A2: There is a statistically significant relationship between NCD type (i.e., cardiovascular conditions, chronic respiratory disease, cancers, and

diabetes), age, gender, duration of participation in MIH-CP, hospital readmission, and self-reported perceived QOL as measured by EQ-5D-3L after completing the MIH program.

Statistical test: Multiple linear regression

RQ3: What is the difference between pre-participation and post-participation scores of self-reported, perceived QOL as measured by EQ-5D-3L in those who participated MIH program?

$H_0$3: There is no statistically significant difference between pre-participation and post-participation scores of self-reported, perceived QOL as measured by EQ-5D-3L in those who participated MIH program.

H_A3: There is a statistically significant difference between pre-participation and post-participation scores of self-reported, perceived QOL as measured by EQ-5D-3L in those who participated MIH program.

RQ4: What is the relationship between NCD type (i.e., cardiovascular conditions, chronic respiratory disease, cancers, and diabetes), age, gender, duration of participation in MIH-CP, hospital readmission, and pre-participation/post-participation score difference of perceived QOL as measured by EQ-5D-3L in individuals who participate in the MIH program?

RQ4: What is the relationship between NCD type (i.e., cardiovascular conditions, chronic respiratory disease, cancers, and diabetes), age, gender, duration of participation in MIH-CP, hospital readmission, and pre-participation/post-

participation score difference of perceived QOL as measured by EQ-5D-3L in individuals who participate in the MIH program?

$H_0$4: There is no statistically significant relationship between NCD type (i.e., cardiovascular conditions, chronic respiratory disease, cancers, and diabetes), age, gender, duration of participation in MIH-CP, hospital readmission, and pre-participation/post-participation score difference of perceived QOL as measured by EQ-5D-3L in individuals who participate in the MIH program.

H_A4): There is a statistically significant relationship between NCD type (i.e., cardiovascular conditions, chronic respiratory disease, cancers, and diabetes), age, gender, duration of participation in MIH-CP, hospital readmission, and pre-participation/post-participation score difference of perceived QOL as measured by EQ-5D-3L in individuals who participate in the MIH program.

Threats to Validity

The validity of scientific inquiry is framed by the notion that truth and accuracy can only be demonstrated through the rigorous application of research processes that are bound by integrity (Roberts, Priest, & Traynor, 2006). Onwuegbuzie (2000) reported that threats to validity may also occur because researchers are reluctant to thoroughly discuss threats to their research because the disclosure may reveal fundamental weaknesses in a study. There are several advantages to addressing validity in research. By identifying the validity threats to a particular study, the researcher frames the inquiry so that false

impressions cannot be made, and that additional study may be warranted (Onwuegbuzie, 2000). Validity addresses the extent to which a study accurately represents what it was supposed to measure (Roberts et al., 2006). Surbhi (2017) stated that validity addresses the soundness of the research design and methods, and that threats to both internal and external validity must be considered.

According to Creswell (2009), internal validity references the factors that could influence the independent variables or interventions. Creswell emphasized the need to maintain internal validity because it is the driving force behind the design and implementation of any research project. The primary goal of an empirical study is to demonstrate that systematic manipulation of the independent variable leads to the general findings for the dependent variables.

Internal validity evaluates the degree to which an independent variable affects a dependent variable, or basically to what extent was a cause and effect relationship demonstrated, whereas external validity pertains to the generalizability of a study (Surbhi, 2017). Another aspect to consider when discussing external validity is ecological validity. Ecological validity takes into consideration how closely related the study is to what is occurring in the natural environment, thus some consider a linkage of ecological validity to external validity (George, Batterham, & Sullivan, 2003). Because the current study will utilize secondary data where the results will not be generalizable, the external validity of this study should be sound (George et al., 2003). It should be noted, however, that because secondary data may be collected for other purposes, that potential biases and quality issues should be considered (Bevan et al., 2013). The

internal validity of the current study is the reliance on previously collected quality of life data that was obtained by a research partner; however this threat was negligible due to the convenience, purposive, sampling approach used in this study design (Bevan et al., 2013).

Because there was no independent means to verify that the information provided for the current study was from survey participants, the content validity of the study is somewhat limited. The reporting instrument may not be able to accurately account for this concern or the operating aspects of the organization supplying the data (Bevan et al., 2013). Also, it is impossible to ascertain the degree to which administrative and operations affected the answering of questions when administering the survey instrument. The EQ-5D-3L was administered via a face-to-face personal interview which permits a control of the situation, higher response rates, and more robust information (Frankfort-Nachmias & Nachmias, 2008b). However, they also reported that interviewer bias may be a concern due to the personal characteristics of the interviewer. While this bias cannot be ruled out, the organization assured me that all MIH-CP personnel had received training on how to administer the survey instrument in a consistent and standardized manner (PC, 2016).

Ethical Procedures

The secondary data obtained from partner organization will not identify the names of the participants. The National Emergency Medical Services Information System (NEMSIS) uses unique patient identifier numbers that are randomly generated to ensure the confidentiality of all personally identifiable patient information (NEMSIS, 2017) and

the research partner is fully compliant with NEMSIS data reporting standards. At no time will there be any attempt to identify the participants of this study. The agreements for data access and analysis will state that participants are to be de-identified. It was the partner organization's responsibility to ensure the confidentiality of the participants in the survey.

Due to the size of the data files, data for this study were shipped via Federal Express, signature required, to the student researcher on an encrypted external drive. Once obtained by me, the data were stored on an encrypted external non-networked hard drive. Participant confidentiality was maintained through de-identification guidance from the U.S. Department of Health and Human Services; (Office of Civil Rights, OCR;, 2012). Also, participants were not identified in the release of information (data) from the prior and current studies.

This study was subject to the review process of the Walden University IRB. No data were provided to me from the partner organization until IRB approval was obtained and documentation was provided by me to the partner organization. IRB approval #05-10-19-0340368 was granted on May 10, 2019. The data exchange with the partner organization originated from their headquarters with the shipment of the data on a password-protected encrypted external drive that was sent to the student researcher via Federal Express, signature required delivery. The partner organization removed all identifiers and no personal information was contained in the dataset that I received. Once obtained by me, the data were stored on an encrypted external nonnetworked hard drive. The data files (electronic and physical) from research partner organization were

destroyed in accordance with the Walden University IRB data destruction guidelines following the SPSS analyses and conferral of the doctoral degree.

Summary

In this chapter, the research design, methodology, procedures for implementing an intervention, and ethical treatment of participants, including informed consent and confidentiality, have been discussed. Many researchers have identified the need to develop improved CDM strategies to mitigate the devastating effects of NCD (Coddington & Moore, 2012). In addition, the WHO has identified NCD mitigation as a global priority (Riley & Cowan, 2015). The research design that was used for this study was a pretest/posttest design using secondary data where the organization providing the data implemented the intervention. I selected this type of research design because it is commonly used in healthcare settings and because the design will support or contest the hypothesis of this study (Baraz et al., 2017; Chapman, 2018; Jacome & Marques, 2014; Naseer et al., 2017; Wittig-Wells et al., 2015). The pretest-posttest design is a good choice when conducting research on interventions that impact quality of life (Abbasi, et al., 2018; Bullen, et al., 2018; Emerson et al., 2016; Gogia & Begum, 2018. When studying research on intervention programs, it is not uncommon to find the pretest-posttest design (Alessandri et al., 2017).

The EQ-5-3L contains the five-dimensional scales of mobility, self-care, usual activities, pain/discomfort and anxiety/depression and is well regarded for reliability and assessing self-perceived quality of life (Agborsangaya, Lahtinen, Cooke, & Johnson, 2014; Brazier, Roberts, Tsuchiya, & Busschbach, 2004; Breivik, Collett, Ventafridda,

Cohen, & Gallacher, 2006; Brooks, 1996; Conner-Spady et al., 2015; Feigin et al., 2016; Mangen et al., 2017; Obradovic, Lal, & Liedgens, 2013; Sommer et al., 2015). Each dimension has three levels; no problems, some problems, extreme problems (Euroqual Research Foundation, 2019). Each respondent is asked to indicate his or her health status by checking a box against the most appropriate statement in each of the five dimensions. The EQ VAS uses a vertical, visual analog scale from 0-100; "endpoint 0= worst imaginable health and endpoint 100= best imaginable health."

Purposive convenience sampling was used for this study. The use of purposive convenience sampling is facilitated by ease of access to the participants and because there are no predetermined variables (Creswell & Creswell, 2018). The sampling frame is comprised of sampling units that appear to be representative of the population and subjective in nature (Creswell & Creswell, 2018; Frankfort-Nachmias & Nachmias, 2008b). The decision to conduct an analysis of MIH-CP data was based on that the partner organization being the only MIH-CP program, nationwide, that captured data relevant to this study and that used an instrument that measured HRQOL (Nejtek et al., 2017).

Multiple regression analyses were conducted between the independent and dependent variables to establish predictive relationships. These statistical tests are well suited for describing the relationship between dependent variables and multiple independent variables (Field, 2009). The multiple regression analyses were utilized to analyze all findings with relationship to the following research questions and hypothesis. The analyses of relationships among variables in this study may be useful for further

inquiry, for knowledge-sharing among health professionals seeking to mitigate the global impact of NCDs, and for world's health policy makers to improve access and care.

The next chapter contains the results of this study. The results for each Research Question are organized in accordance with the data analysis plan. I have also discussed how the data were reviewed and cleaned and have included demographic and descriptive statistics with the results of the study.

Chapter 4: Results

Introduction

The purpose of this study was to analyze the relationship between NCD type; age; gender; duration of participation in MIH-CP; hospital readmission; and self-reported, perceived QOL as measured by the EQ-5D-3L for those who received services from the MIH-CP program. The demonstration of MIH-CP as a CDM intervention may have an important impact on care delivery for persons with NCDs. MIH-CP requires a partnership between many stakeholders (i.e., patients, hospitals, physicians, home health agencies, government, payers, and other ancillary health entities; Zavadsky & Hooten, 2016). Understanding NCDs and the driving forces behind emerging CDM models is critically important for achieving success in mitigating this global health crisis.

The following research questions and hypotheses guided this study:

RQ1: What is the relationship between NCD type (i.e., cardiovascular conditions, chronic respiratory disease, cancers, and diabetes), age, gender, duration of participation in MIH-CP, hospital readmission, and self-reported perceived QOL as measured by EQ-5D-3L before entering the MIH program?

$H_0$1: There is no statistically significant relationship between NCD type (i.e., cardiovascular conditions, chronic respiratory disease, cancers, and diabetes), age, gender, duration of participation in MIH-CP, hospital readmission, and self-reported perceived QOL as measured by EQ-5D-3L before entering the MIH program.

H_A1: There is a statistically significant relationship between NCD type (i.e., cardiovascular conditions, chronic respiratory disease, cancers, and diabetes), age, gender, duration of participation in MIH-CP, hospital readmission, and self-reported perceived QOL as measured by EQ-5D-3L before entering the MIH program.

RQ2: What is the relationship between NCD type (i.e., cardiovascular conditions, chronic respiratory disease, cancers, and diabetes), age, gender, duration of participation in MIH-CP, hospital readmission, and self-reported perceived QOL as measured by EQ-5D-3L after completing the MIH program?

H_02: There is no statistically significant relationship between NCD type (i.e., cardiovascular conditions, chronic respiratory disease, cancers, and diabetes), age, gender, duration of participation in MIH-CP, hospital readmission, and self-reported perceived QOL as measured by EQ-5D-3L after completing the MIH program.

H_A2: There is a statistically significant relationship between NCD type (i.e., cardiovascular conditions, chronic respiratory disease, cancers, and diabetes), age, gender, duration of participation in MIH-CP, hospital readmission, and self-reported perceived QOL as measured by EQ-5D-3L after completing the MIH program.

RQ3: What is the difference between pre-participation and post-participation scores of self-reported, perceived QOL as measured by EQ-5D-3L in those who participated MIH program?

$H_0$3: There is no statistically significant difference between pre-participation and post-participation scores of self-reported, perceived QOL as measured by EQ-5D-3L in those who participated MIH program.

H_A3: There is a statistically significant difference between pre-participation and post-participation scores of self-reported, perceived QOL as measured by EQ-5D-3L in those who participated MIH program.

RQ4: What is the relationship between NCD type (i.e., cardiovascular conditions, chronic respiratory disease, cancers, and diabetes), age, gender, duration of participation in MIH-CP, hospital readmission, and pre-participation/post-participation score difference of perceived QOL as measured by EQ-5D-3L in individuals who participate in the MIH program?

$H_0$4: There is no statistically significant relationship between NCD type (i.e., cardiovascular conditions, chronic respiratory disease, cancers, and diabetes), age, gender, duration of participation in MIH-CP, hospital readmission, and pre-participation/post-participation score difference of perceived QOL as measured by EQ-5D-3L in individuals who participate in the MIH program.

H_A4: There is a statistically significant relationship between NCD type (i.e., cardiovascular conditions, chronic respiratory disease, cancers, and diabetes), age, gender, duration of participation in MIH-CP, hospital readmission, and pre-participation/post-participation score difference of

perceived QOL as measured by EQ-5D-3L in individuals who participate in the MIH program.

Data Collection

Before requesting the data from the partner organization, I applied for and secured approval from the Walden University IRB. The application was submitted on April 30, 2019 and Approval No. 05-10-19-0340368 was granted on May 10, 2019. I contacted the partner organization at that time and provided proof of IRB approval. I received the data file on May 17, 2019. The original data set submitted to me for review included data for 1,349 participants from 2015 through 2018.

Data Cleaning and Review of Data

As part of the data cleaning process, I determined that the data would best be organized, cleaned, and analyzed by first converting the multiple Excel files into one common database. Filemaker Pro was deemed to be the most suitable application for this study because I am a licensed user and have over 30 years of advanced experience using the product. A relational database was created to import the participant data from each independent Excel file, matching data by individual participant identification number. Relational databases are designed to allow the cross-referencing of data between one or more individual databases via a common data element (Hasan & Huq, 2016). For this study, the common data element was the participant identification number, which was used to cross-reference and enter demographic data into one common database that was then used to input into SPSS. The research partner provided an individual participant identification number that was uniformly referenced in all Excel files. The identification

number served as the matching point to combine data from multiple sources so that all variables were in one Excel data set that could be imported into SPSS.

Following the import of the dataset into the database, I manually reviewed the file to verify that each occurrence of the independent and dependent variables was recorded by the research partner and to scan for duplicates and missing values. It was during this review that I discovered a concerning discrepancy with respect to the enrollment identification number. I immediately contacted the partner organization to determine the reason for the discrepancy and how I might be able to obtain a revised data set.

The data design and groupings of the variables for this study were based on descriptions contained in the EQ-5D-3L (Euroqual Research Foundation, 2017) user guide and through personal interview with the research partner's principal MIH division (PC, 2016). The initial data set provided by the partner organization listed two discrete identification number for participants. This numbering system included an enrollment number and a client identification number for each participant, but when performing the relational database imports of the data, I discovered that some data elements could not be imported because of a mismatch or absence of an enrollment number.

Initially, I made the presumption that organization might have assigned one unique client number for each "customer" and then a unique enrollment number for the MIH-CP encounters. In other words, John Doe might be Client 12345 but have used the MIH intervention multiple times, generating a new enrollment number each time. Upon consultation with the organization's chief information officer I was informed that the organization had changed EHR systems in 2017 and that the change in EHR systems was

the root cause of the problem since data were requested from 2015 through 2019. The forward thinking of the organization's CIO enabled the creation of a new data set for this study by analyzing an alias identification number during the EHR transition. Identifying this discrepancy was essential to preparing accurate analyses of the data and for salvaging the data for this study. The discrepancy could have created mismatch issues that would have potential counted enrollees twice or omitted some altogether.

A revised data set was obtained from the research partner and imported into the database, and I again manually reviewed the data set to scan for duplicates and missing values. Data cleaning resulted in the deletion of 704 participant records that were identified as duplicates or missing variables that were required to answer each research question. A total of 645 cases were deemed to be appropriate for analysis having both pretest and posttest data for the MIH-CP intervention and were included in the data analyses for the study.

Results

Demographics

My research partner organization collected demographic data including age, gender, NCD type, days enrolled in MIH-CP, and whether the participant was readmitted to the hospital following the intervention. Table 3 shows a summary of demographics for the study participants. The age group with the highest utilization of the MIH-CP intervention was 50–59 years old (27.75%). The gender distribution was predominantly female (53.8%). Approximately half of the cases (48.44%) were reported to be cardiovascular NCDs. For days spent in the MIH-CP intervention, slightly more than

half (54.4%) were in the 31–60-day range, and most of the cases (85.6%) did not require hospitalization following the MIH-CP intervention.

Table 3

Demographics

Variable	Category	Percentage
Age	18–29	3.88%
	30–39	6.37%
	40–49	12.86%
	50–59	27.75%
	60–69	23.72%
	70–79	16.27%
	80+	9.15%
Gender	Male	46.2%
	Female	53.8%
NCD type	Cardiovascular	48.44%
	COPD	27.6%
	Diabetes	24.0%
	Cancer	0.0%
MIH days (range)	< 30	21.9%
	31–60	54.4%
	61–90	7.6%
	91+	16.1%
Hospital readmission	Yes	14.4%
	No	85.6%

Note. $N = 645$.

Descriptive statistics of EQ-5D-3L scores. I performed an analysis on the EQ-5D-3L survey responses for each dimension and the resulting statistics. The analysis was conducted to compare the relationship of each dimension of the survey with the reported pretest and posttest health scores. Table 4 shows the descriptive statistics for the EQ-5D-3L survey pretest scores, and Table 5 contains those for the posttest scores.

Table 4

Descriptive Statistics for EQ-5D-3L Pretest Scores

Dimension	Response	Frequency (%)
Mobility (N = 645)	I have no problems in walking about	36.12
	I have some problems in walking about	62.02
	I am confined to bed	1.86
Self-care (N = 645)	I have no problems with self-care	63.10
	I have some problems washing or dressing myself	34.11
	I am unable to wash or dress myself	2.79
Usual activities (N = 645)	I have no problems with performing my usual activities	39.07
	I have some problems with performing my usual activities	55.97
	I am unable to perform my usual activities	4.96
Pain/discomfort (N = 645)	I have no pain or discomfort	46.36
	I have moderate pain or discomfort	42.48
	I have extreme pain or discomfort	11.16
Anxiety/depression (N = 645)	I am not anxious or depressed	57.21
	I am moderately anxious or depressed	33.33
	I am extremely anxious or depressed	9.46

Table 5

Descriptive Statistics for EQ-5D-3L Posttest Scores

Dimension	Response	Frequency (%)
Mobility (*N* = 645)	I have no problems in walking about	55.19
	I have some problems in walking about	43.26
	I am confined to bed	1.55
Self-care (*N* = 645)	I have no problems with self-care	63.10
	I have some problems washing or dressing myself	34.11
	I am unable to wash or dress myself	2.79
Usual activities (*N* = 645)	I have no problems with performing my usual activities	61.24
	I have some problems with performing my usual activities	36.74
	I am unable to perform my usual activities	2.02
Pain/discomfort (*N* = 645)	I have no pain or discomfort	63.26
	I have moderate pain or discomfort	32.71
	I have extreme pain or discomfort	4.03
Anxiety/depression (*N* = 645)	I am not anxious or depressed	71.32
	I am moderately anxious or depressed	26.20
	I am extremely anxious or depressed	2.48

Independent Sample *t*-Test Analyses

Independent sample-*t*-Tests were performed to provide additional information about the sample and the differences in dependent variables means based on groups within independent variables (Creswell & Creswell, 2018; Field, 2013). For the purposes of these analyses, the independent variables were recoded into binary groups and compared to the dependent variable between those groups (such as gender into males and females). The independent samples-*t*-Tests were performed on the EQ-5D-3L scores of both the pretest and posttest groups.

Pretest results. Independent *t* Test analyses were conducted in order to determine if there were statistically significant differences in the pretest EQ-5D-3L scores between groups in the independent variables of gender, NCD type, age in years, days in MIH, and hospital readmission. Statistically significant differences in pretest scores were only identified between groups in the number of days in MIH ($p = .001$) and hospital readmission status ($p = .001$). The results of the *t* tests can be found in table 6.

Table 6

Results of Independent Sample t Test: EQ-5D-3L Pretest Scores

Demographic	Groups	*N*	*Mean*	*SD*	*P* value
Gender	Males	298	55.58	20.22	.48
	Females	347	54.44	20.48	
NCD	Cardiovascular/respiratory	490	52.88	21.49	.05
	Cancer/diabetes	155	57.60	20.95	
Days in MIH	<100	622	55.38	20.32	.01**
	100+	23	43.78	18.41	
Hospital Readmission Status	No	550	54.81	20.58	.01**
	Yes	93	55.28	18.84	

*=Statistically significant at p<.05 level
**Statistically significant at p<.01 level

Posttest results. Independent *t* Test analyses were conducted in order to determine if there were statistically significant differences in the posttest EQ-5D-3L scores between groups in the independent variables of gender, NCD type, age in years, days in MIH, and hospital readmission. Statistically significant differences in posttest EQ-5D-3L scores were not found between the groups in these independent variables. Table 7 shows the results of these analyses.

Table 7

Results of Independent Sample t Test: EQ-5D-3L Posttest Scores

Demographic	Groups	*N*	*M*	*SD*	*p*
Gender	Males	298	74.96	17.45	.87
	Females	347	74.74	17.09	
NCD	Cardiovascular/respiratory	490	74.30	17.03	.14
	Cancer/diabetes	155	75.55	18.20	
Days in MIH	<100	622	74.99	17.32	.28
	100+	23	71.04	14.75	
Hospital Readmission Status	No	550	74.90	17.68	.88
	Yes	93	74.65	14.53	

*=Statistically significant at p<.05 level
**Statistically significant at p<.01 level

Multicollinearity (linear regression assumption). Prior to conducting multiple linear regression, the correlations between variables were examined using the Pearson's correlation coefficient test in SPSS in order to determine if multicollinearity between variables exists. This testing was completed to determine if any of the variables (predictor or criterion) were highly correlated at (+/-) 0.8 or higher. It is recommended that if two or more variables are highly correlated that one or more be removed from analyses in order to minimize the potential for multicollinearity (Field, 2013). Field (2013) recommended that further scrutiny of variable correlation should be completed

using additional SPSS collinearity diagnostics such as measuring the variance inflation factor (VIF) and that the VIF should be less than 10.

There were no variables highly correlated (at (+/-) 0.8 or higher) to one another. The VIF of each independent variable was also examined to verify the absence of multicollinearity so no variables needed to be removed from the regression testing. The range for all the variables was (-.245<R>.471). After reviewing the correlation analysis, it was deemed that a forced entry model would be appropriate for all regression testing since multicollinearity was not a factor (Field, 2013). Table 8 shows a summary of the correlation analysis.

Table 8

Results of Pearson's Correlation Coefficient Testing Between Variables

	NCD	Gender	Age	MIH Days	Hospital Readmission
NCD	1	.044*	-.193**	.161	.054
Gender	.044*	1	.032*	.064	-.010**
Age	-.193**	.032*	1	-.245**	-.105**
MIH Days	.161	.064	-.245**	1	-.003**
Hospital Readmission	.054	-.010**	-.105**	-.003**	1

*=Statistically significant at p<.05 level
**Statistically significant at p<.01 level

Osborne and Waters (2002) reported that researchers should always consider the four assumptions of multiple regression when employing the analysis because the validity of the results could be jeopardized by misestimating the true relationship causing Type I (overestimation) or Type II (underestimation) errors. The assumptions for consideration

are: (a) linearity, (b) reliability of measurement, (c) homoscedasticity, and (d) normality (Osbourne & Waters, 2002). Field (2013) suggested that linearity can be tested with scatter plots. In the field of social science, it is not uncommon to encounter a non-linear relationship so a research must be able to explain the relationships more carefully (Osbourne & Waters, 2002).

Upon reviewing the correlation analysis, I determined that the forced entry method was appropriate for all multiple regression analyses. This decision was also supported by the calculations of the Kolmogorov-Smirnov goodness of fit test for each of the dependent variables as all of the variables did not show statistically significant results. Appendix C contains all charts and graphs relevant to the assumption calculations including the Kolmogorov-Smirnov goodness of fit test for each of the dependent variables.

Research Question 1 (RQ1) Results

Pretest total score. A multiple linear regression analysis was run using the standard forced entry ("Enter") model. There was no advantage to removing any of the variables from the model and since multicollinearity was not a concern (Field, 2013) the forced entry method was chosen. The use of the forced entry model was supported by the absence of multicollinearity and the Kolmogorov-Smirnov test results (Hu, Yu, & Wang, 2017).

Non-communicable disease type (NCD Type; $p = .036$) and days in MIH ($p = .000$) were found to be related to self-reported perceived QOL as measured by EQ-5D-3L before entering the MIH program (pretest-EHS) at statistically significant levels.

However, the other independent variables used for this research question (gender, age, hospital admission status) were not related to the pretest scores at statistically significant levels. Therefore, the null hypothesis is not rejected. Table 9 shows the results of these analyses.

Table 9

Multiple Linear Regression Coefficients: Independent Variables and Pretest EHS

		Unstandardized Coefficients		Standardized coefficients		
Model		*B*	Std. error	Beta	*t*	Sig.
1	(Constant)	57.05	4.10		13.93	.000
	NCD Type	1.42	.677	.084	2.10	.036*
	Age in years	.036	.055	.027	.65	.517
	Gender	-.896	1.59	-.022	-.56	.574
	Days in MIH	-.113	.029	-.160	-3.95	.000**
	Hospital Readmission	1.81	2.05	.035	.884	.377

*=Statistically significant at p<.05 level
**Statistically significant at p<.01 level

Research Question 2 (RQ 2) Results

RQ2: What is the relationship between NCD type (i.e., cardiovascular conditions, chronic respiratory disease, cancers, and diabetes), age, gender, duration of participation in MIH-CP, hospital readmission, and self-reported perceived QOL as measured by EQ-5D-3L after completing the MIH program?

Posttest total score. A multiple linear regression analysis was run using the standard forced entry ("Enter") model. There was no advantage to removing any of the

variables from the model and, since multicollinearity was not a concern (Field, 2013), the forced entry method was chosen. The use of the forced entry model was supported by the absence of multicollinearity and the Kolmogorov-Smirnov test results (Hu et al., 2017).

None of the variables (gender, NCD type, days in MIH, age, and hospital admission status) were found to be related at statistically significant levels to self-reported perceived QOL as measured by EQ-5D-3L after entering the MIH program (pretest-GHS) Therefore, the null hypothesis is retained. Table 10 shows the results of these analyses.

Table 10

Multiple Linear Regression Coefficients: Independent Variables and Posttest GHS

		Unstandardized Coefficients		Standardized coefficients		
Model		*B*	Std. error	Beta	*t*	Sig.
1	(Constant)	80.723	3.519		22.94	.000
	NCD Type	-.126	.582	-.009	-.22	.829
	Age in years	-.086	.048	-.075	-1.80	.073
	Gender	-.086	1.37	-.002	-.06	.950
	Days in MIH	-.012	.025	-.020	-.48	.631
	Hospital Readmission	-.511	1.758	-.012	-.291	.771

*=Statistically significant at p<.05 level
**Statistically significant at p<.01 level

Research Question 3 (RQ 3) Results

RQ3: What is the difference between pre-participation and post-participation scores of self-reported, perceived QOL as measured by EQ-5D-3L in those who participated MIH program?

In order to determine the results to this research question, I conducted a paired sample *t* test to determine if there was a statistically significant difference between the mean pretest scores and the posttest scores on the EQ-5D-3L. The difference in scores between the pretest and posttest administration of the EQ-5D-3L was statistically significant ($p = .000$). The mean difference in the scores were 19.88 which means that the perceived quality of life after the intervention increased by nearly 20 points. This difference may indicate an increase in perceived quality of life upon graduation from the MIH-CP program. Further discussion of this reported result will be further discussed in greater detail in chapter five. The null hypothesis is rejected and the alternative hypothesis accepted. Table 11 contains the results of the paired sample t-test.

Table 11

Paired Sample t-Testing Results- Pretest EQ-5D-3L Score Versus Posttest EQ-5D-3L Score

Paired Differences							
			95% Confidence Interval of the Mean		*t*	*df*	Sig (2-tailed)
M	SD	Std. Error Mean	Lower	Upper			
19.89**	23.59	.93	18.05	21.70	-21.40**	644	.000**

*=Statistically significant at p<.05 level
**Statistically significant at p<.01 level

Research Question 4 (RQ 4) Results

RQ4: What is the relationship between NCD type (i.e., cardiovascular conditions, chronic respiratory disease, cancers, and diabetes), age, gender, duration of participation in MIH-CP, hospital readmission, and pre-participation/post-participation score difference of perceived QOL as measured by EQ-5D-3L in individuals who participate in the MIH program?

A multiple linear regression analysis was run using the standard forced entry ("Enter") model. There was no advantage to removing any of the variables from the model and since multicollinearity was not a concern (Field, 2013) the forced entry method was chosen. The use of the forced entry model was supported by the absence of multicollinearity and the Kolmogorov-Smirnov test results (Hu et al., 2017).

Non-communicable disease type (NCD Type) (p=.049) and days in MIH (p=.002) were found to be related to calculated pretest/posttest EQ-5D-3L score differences at statistically significant levels. However, the other independent variables used for this research question (gender, age, hospital admission status) were not related to the pre-participation/post-participation score difference at statistically significant levels. Therefore, the null hypothesis is retained. Table 12 shows the results of these analyses.

Table 12

Multiple Linear Regression Coefficients: Independent Variables and EHS/GHS Difference

		Unstandardized Coefficients		Standardized coefficients		
Model		*B*	Std. error	Beta	*t*	Sig.

1	(Constant)	23.68	4.76		4.98	.000
	NCD Type	-1.55	.786	-.079	-1.97	.049*
	Age in years	-.121	.064	-.077	-1.89	.060
	Gender	.810	1.85	.017	.44	.662
	Days in MIH	.102	.033	.124	3.05	.002*
	Hospital Readmission	-2.32	2.38	-.038	-.976	.329

*=Statistically significant at p<.05 level
**Statistically significant at p<.01 level

Summary

Noncommunicable disease type (p = .036) and days in MIH (p = .000) were found to be related to self-reported perceived QOL as measured by EQ-5D-3L before entering the MIH program (pretest-EHS) at statistically significant levels (RQ 1). However, the other independent variables used for this research question (gender, age, hospital admission status) were not related to the pretest scores at statistically significant levels so the null hypothesis for Research Question 1 cannot be rejected. None of the independent variables (gender, NCD type, days in MIH, age, and hospital admission status) were found to be related at statistically significant levels to self-reported perceived quality of life as measured by EQ-5D-3L after entering the MIH program (RQ 2). Therefore, the null hypothesis for Research Question 2 is retained. The difference in scores between the pretest and posttest administration of the EQ-5D-3L was statistically significant (p = .000). The mean difference in the scores were (M = 19.89, SD = 23.6) which indicates an increase in perceived quality of life upon graduation from the MIH-CP because of the statistically significant findings (RQ 3). The null hypothesis is rejected for Research

Question 3 and the alternative hypothesis accepted. NCD type (p = .049) and days in MIH (p = .002) were found to be related to calculated pretest/post-test EQ-5D-3L score differences at statistically significant levels (RQ 4). However, the other independent variables used for this research question (gender, age, hospital admission status) were not related to the pretest scores at statistically significant levels. Therefore, the null hypothesis for Research Question 4 is retained. In Chapter 5 I will provide interpretation of the findings, identify the limitations of the study. I will also provide recommendations for further research and discussion potential implications for positive social change.

Chapter 5: Discussion, Conclusions, and Recommendations

Introduction

The purpose of this study was to perform a secondary analysis on pretest/posttest data from a research partner who implemented a MIH-CP intervention for persons with NCDs. I performed this study to investigate the relationship between NCD type (i.e., cardiovascular conditions, chronic respiratory disease, cancers, and diabetes), age, gender, duration of participation in MIH-CP, hospital readmission, and self-reported perceived QOL as measured by the EQ-5D-3L (see Euroqual Research Foundation, 2019). The research partner organization collected the pretest/posttest data on the 704 participants in this study. The pretest perceived QOL data were collected using the EQ-5D-3L before entering MIH-CP and the posttest perceived QOL data were collected upon graduation from MIH-CP. The differences between those scores are each related to separate research questions posed in this study.

NCDs are considered to be one of the most wide-reaching challenges facing the global health community, and engagement of patients, families, and communities is essential in developing new chronic disease management strategies (Dye et al., 2018; FitzGerald & Poureslami, 2014; Lee, Choi, Lee, & Jiang, 2018). Potential premature death has the potential to be addressed through innovation in treatment, programs to assist with addressing unhealthy behaviors, and government policy change (Lee et al., 2018; McQueenie, Ellis, McConnachie, Wilson, & Williamson, 2019; Miller, Lasiter, Bartlett Ellis, & Buelow, 2015). Self-management programs are used in an attempt to engage patients and families to take more active roles in managing a chronic illness

through empowerment and providing education and training about healthier behavior alternatives (Musekamp et al., 2016). A determining factor of whether self-management programs are successful is through the patient achieving self-efficacy (Rosenstock, 1966). In achieving self-efficacy, the patient becomes better educated about the NCD(s) they are diagnosed with and take ownership of managing their NCDs to mitigate the disease effects to improve their QOL (Barley & Lawson, 2016). MIH-CP is one such self-management program (Choi et al., 2016; Zavadsky, Hagen, et al., 2015; Zavadsky & Hooten, 2016).

While the data analyses related to Research Questions 1 and 4 indicated that some of the independent variables were related to the dependent variable of QOL at statistically significant levels, not all of these relationships were statistically significant, so I was not able to reject the null hypotheses for these research questions. The statistically significant variables for RQ 1 were NCD type ($p = .036$) and days in MIH ($p = .000$), and the statistically significant variables for RQ 4 were also NCD type ($p = .049$) and days in MIH ($p = .002$). The results of the paired sample t test between the pretest and posttest scores on the EQ-5D-3L for Research Question 3 indicated a statistically significant difference with an increase in the mean score of 19.88.

Interpretation of the Findings

Research Question 1

My findings revealed two independent variables that were related to the dependent variable. There was a statistically significant relationship between NCD type ($p = .036$) and days in MIH-CP ($p = .000$) pretest EQ-5D-3L scores. However, the

relationship between the other independent variables and the dependent variable showed no statistical significance, so the null hypothesis was not rejected. As discussed in Chapter 2, there were no comparison studies to measure these results against, so it is not possible to determine if my results supported or did not support the findings of other researchers.

Even though there were not studies I could exactly compare to, I examined MIH-CP studies that were similar in nature. Researchers in Indianapolis, Indiana examined pre- and post-data from a MIH-CP pilot study of persons with NCDs to determine what effect, if any, the MIH-CP intervention had on hospital readmissions (Siddle et al., 2018a). Using data from a cohort study that reviewed the EHRs of patients ($N = 203$), the researchers found that the MIH-CP intervention was associated with reduced hospitalizations (Siddle et al., 2018a). In Maryland, researchers examined the MIH-CP intervention and its relationship to overuse of the 911 system and unnecessary ED visits, concluding that the intervention did reduce 911 utilization (King, Neely, Dinglas, Matz, & Fletcher, 2016). Pang et al. (2019) conducted a systematic review of multiple MIH-CP programs throughout the U.S. to examine the relationship between MIH-CP and improved patient outcomes. Pang et al. reported that a lack of MIH-CP data existed, that programs using MIH-CP conducted research for varying reasons (i.e. cost, program effectiveness, readmission reduction, etc.), and that additional data on MIH-CP was urgently needed from additional studies to support the intervention.

Since statistically significant relationships were identified between NCD type and days in MIH, it is reasonable to suggest that the theoretical framework of the HBM was

appropriate for this study. The HBM addresses the relationship between a person's individual values and expectations for avoiding disease as well as what they expect to achieve from engaging in a healthier lifestyle, behavior, or intervention (i.e., the value-expectancy theory; Boslaugh, 2013). Concerning this study, entry in the MIH-CP program could be perceived as an individual's activation of the health perceptions of the HBM (i.e., susceptibility, severity, benefits, barriers, cue to action, and self-efficacy; see Boslaugh, 2013; Jalilian et al., 2014). This individual assessment triggers the cue to action where they choose to enroll in the program and ideally comply with the prescribed treatments and lifestyle changes that eventually lead to self-efficacy (i.e., the belief that they can execute the necessary changes to improve their quality of life; Bandura, 1977; Boslaugh, 2013; Jalilian et al., 2014).

Research Question 2

None of the variables (i.e., gender, NCD type, days in MIH, age, and hospital admission status) were found to be related at statistically significant levels to self-reported, perceived QOL as measured by EQ-5D-3L after completing the MIH program (posttest-GHS) Therefore, the null hypothesis was retained. There were no comparison studies that I could find that I could measure these results against, so it was not possible to determine if my results supported or did not support the findings of other researchers. Due to the lack of comparison studies, I researched studies of similar nature to compare and contrast outcomes to the results of my study (see King et al., 2016; Nolan, Nolan, & Sinha, 2018; Pang et al., 2019; Siddle et al., 2018b) in that researchers studied the MIH-CP concept in relationship to many variables (i.e. cost, program effectiveness,

readmission reduction, etc.); however, no clear connection to a MIH-CP study assessing the QOL could be established.

Since other MIH-CP comparison studies could not be located, I searched for and examined other interventional studies that utilized a similar research design. Mussa et al. (2018) examined the perceived QOL for persons with chronic lung disease who utilized portable continuous oxygen therapy delivery systems and had received coaching by respiratory care providers, reporting that those who received coaching had experienced improved QOL. McCusker et al. (2019) investigated the relationship between support from a primary care physician and improved patient activation for persons with NCDs. In both of these studies, the participants received some form of professional guidance and experienced either improved QOL, improved compliance with disease management strategies, and/or a higher level of self-efficacy (McCusker et al., 2019; Mussa et al., 2018). Education and coaching are part of MIH-CP, which is why I carried out a comparison to these studies.

Research Question 3

The difference in scores between the pretest and posttest administration of the EQ-5D-3L was statistically significant ($p = .000$). The mean difference in the scores were 19.88, which means that the perceived QOL after the intervention increased by nearly 20 points. This difference may indicate an increase in perceived QOL upon graduation from the MIH-CP program. I could not locate other studies where researchers measured the change in perceived QOL in participants who underwent a MIH-CP program, so no comparison was available. Upon measuring and recording an

approximate 20-point increase in self-reported, perceived QOL following the completion of the MIH-CP program, I was led to believe that the HBM was appropriate for this study.

Research Question 4

NCD type ($p = .049$) and days in MIH-CP ($p = .002$) were found to be related to calculated pretest-posttest EQ-5D-3L score differences at statistically significant levels. However, the other independent variables used for this research question (i.e., gender, age, and hospital admission status) were not related to the preparticipation-post-participation score difference at statistically significant levels. Therefore, the null hypothesis was retained.

Since I could not locate other studies where researchers measured the change in perceived QOL in participants who underwent a MIH-CP program, I could not determine if my results supported or did not support the findings of other researchers. The studies that I could examine looked at other variables in relationship to MIH-CP (i.e., cost, program effectiveness, readmission reduction, etc.); however, Choi (2016) reported that, even in the absence of national standards and metrics for MIH-CP, the initiative appears to be supported by the limited data that has been collected and that the program appears to reduce unnecessary 911 utilization, hospital readmissions, and unwarranted ED visits. Pang et al. (2019) reported that data from their work showed great promise for the MIH-CP intervention and that urgent additional studies are needed in order to make future recommendations on the overall safety, generalizability, and cost-effectiveness of the

program. Evaluating these other studies was necessary to determine what other MIH-CP research had been conducted and how this study differed in design and results.

The statistical significance that was identified in this study continues to support my belief that the activation of the HBM was achieved. NCD type (p = .049) and days in MIH-CP (p = .002) were found to be related to the calculated pretest/posttest EQ-5D-3L score. Upon examining these findings for this research question, I continue to believe that the HBM was appropriate for this study and that self-efficacy might be a consideration as to the statistically significant findings (see Bandura, 1977.; Boslaugh, 2013; Jalilian et al., 2014).

Limitations of the Study

This study had several limitations. The first limitation was related to the reliability and validity of the data collection tool used by the research partner organization. Fang et al. (2016) reported that the EQ-5D-3L is a valid and reliable survey instrument, but it may lack the sensitivity and precision of other tools (Janssen et al., 2018). Janssen et al. (2018) reported that the EQ-5D-5L was superior to the EQ-5D-3L because the additional two levels of assessment allowed the researcher to gain better insight on the levels of limitations. I was limited in terms of initial data collection processes used to generate the secondary data I used because the instrumentation used by the research partner organization was determined and in place before I started this study, so I was not able to have input about what was used. The PC (2016) indicated that the choice in survey instrument was made by their organization based on the recommendation of the CMS AHRQ and that it would be appropriate for the demographic region under study.

The second limitation was that the content validity of the study was limited as there was no independent means to verify that the information provided for the current study was actually from patients who participated in the MIH-CP program. I was not visually able to confirm this as I did not collect primary data and had to trust the information about data collection that was shared with me by the organization. Using secondary data collected by others requires the researcher using that data to trust the original organization/data collectors that they are only providing actual data and that data has been collected and entered accurately (Bevan et al., 2013; Dunn, Arslanian-Engoren, DeKoekkoek, Jadack, & Scott, 2015; Frankfort-Nachmias & Nachmias, 2008c).

The organization indicated they only supplied data for patients who met their inclusion/exclusion criteria and completed the MIH-CP program. They also were cooperative when I identified discrepancies in the data and asked them to check to ensure that what they provided me was accurate (see Chapter 4). Their response to my inquiries and their willingness to check the data, make corrections, and supply me with updated and accurate data reinforced that the organization was attempting to be transparent which bolstered my trust in them and their provided data. The original data set supplied by the research partner was found to have some identification number discrepancies. The initial data set provided by the partner organization listed two discrete identification number for participants. This numbering system included an enrollment number and a client identification number for each participant but when performing the relational database imports of the data, I discovered that some data elements could not be imported because of a mismatch or absence of an enrollment number.

The third limitation was that the potential for interviewer bias. Interviewer bias may occur during the face-to-face data collection because of the trusted relationship building that occurs between staff and patients during the intervention and that relationship could produce biased judgements (Buijsrogge, Derous, & Duyck, 2016). While not completing interviews, the partner organization collected the data verbally with the incoming and outgoing patient so this could be a factor. The research partner organization assured me that all MIH-CP personnel have received training on how to administer the survey instrument in a consistent and standardized manner (PC, 2016).

Recommendations

Based on the results of this study, I would recommend that additional research be conducted to determine if similar or differing results can be established with other MIH-CP programs throughout the United States and abroad. The use of more sensitive and precise survey instruments to measure QOL should be considered but not without evaluating the unique demographic composition among various populations. More reliable survey instruments have been used to assess HRQOL in other areas of research (Lins & Carvalho, 2016).

I also recommend that if other researchers conduct a duplication or similar study that they include health literacy as a variable as well as health behavior before and after participation in the MIH-CP program. Health literacy has been found to be related to compliance with treatment recommendations, decision-making about health related choices, and improved quality of life (Crowe, Mullen, & Littlewood, 2018; FitzGerald & Poureslami, 2014; Neter & Brainin, 2019). Health behavior is as equally important as

health literacy because education is required to reduce the number of healthcare-related frustrations that persons with chronic disease often encounter (Smith et al., 2017).

It may also be beneficial for future researchers to conduct mixed methods research where they not only evaluate the quantitative variables like I did in my study but also interview participants about topics such as their motivation for joining the MIH-CP program, what they hope the outcomes are, and if those outcomes were met through their participation. Having more in-depth information about these things make inform why or why not their perceived quality of life did or did not change through MIH-CP participation. It would be beneficial to do these types of interviews before and after going through the program to be able to qualitatively explore changes in different factors that may not be able to be measured through quantitative instruments.

Implications

The prevalence of NCDs is considered to be one of the most important challenges facing the global health community (Allen & Bloomfield, 2016; FitzGerald & Poureslami, 2014; Toebes, Hesselman, van Dijk, & Herman, 2017). Identifying strategies for mitigating of the effects of NCDs is necessary (Riley et al., 2017). Further study on the MIH-CP concept by health policy-makers, healthcare payers, and public health agencies is a reasonable action considering the nature of the NCD problem. This study could provide these stakeholders with actionable information as to how they might improve CDM using another tool. Also, the statistically significant findings of my research, particularly the near twenty-point improvement in self-reported self-perceived

improved QOL are representative of a well-intentioned study that reported a positive result in combating the NCD problem.

Chronic disease leads to a healthcare spending and health care resource burden for individuals and societies (Greene et al., 2013). In 2014, the annual estimated economic costs of NCDs within the United States, including treatment and productivity losses, was $1.3 trillion (Chatterjee et al., 2014). According to Bloom et al. (2011), the projected global economic costs related to NCDs will reach $47 trillion by 2030. The human cost associated with NCDs may result in a shortage of human capital and global economic disruption (Bloom et al., 2011). Researchers have shown that programs to address NCDs must include a new framework that revolves around global health equity and that existing CDM models are obsolete (Nulu, 2017).

Further study on the effectiveness of MIH-CP and other health programs that address NCDs in order to improve quality of life for those with NCDs is important. A better understanding of not only how NCDs are related to the perception of QOL and also how that perception can be changed through healthcare programs have potential benefits outside of just the individual. Researchers have found that health is related to things like mood, mental illness, and other factors that not only impact the individual but those around them (McCusker et al. 2019; Zimmerman et al. 2019). Those who have NCDs have been found to have depression and reduced productivity (Theurer et al., 2015). In addition, having a family member who has one or more NCDs can put stress on the family structure and other family members because of depression and other factors (Alizadeh et al., 2018).

Conclusion

Since I could not locate other studies where researchers measured the change perceived quality of life in participants who underwent a MIH-CP program, I could not determine if my results supported or did not support the findings of other researchers but the results of this study. I was not surprised by the findings of my research because I could not find any other MIH-CP program that assessed QOL by comparing pretest/posttest data. I believe that this finding adds strength to my research and that it should provide an impetus for duplicating or expanding research in the field of MIH-CP. This future research should not simply focus on MIH-CP but rather evaluate a multitude of CDM strategies. MIH-CP cannot be the only solution. The global health community needs to be involved due to the nature of the problem and the priorities identified by the WHO and the action of nations and policy-makers must be robust (Riley et al., 2017). This study identifies one possible tool in reducing the proliferation of NCDs.

While the results did demonstrate statistical significance in increasing the perceived quality of life upon graduation from the MIH-CP program, generalizability is not possible. Demographics, disease prevalence, education, and health literacy may also play a role in other similar studies. Since no comparison studies were available, it is impossible to determine how these factors may influence the results of future investigations so as new evidence becomes available it should be thoroughly evaluated. I was also concerned that the sensitivity of the survey instrument may not be adequate. The research partner for this study had already chosen the survey instrument and recorded participant data, but as I have identified in my recommendations other more

sensitive instruments are available. Their use, however, must be weighed against population they are being used for.

The HBM appeared to be an appropriate theoretical framework for this study as it was possible that each of the six levels of the framework were activated. The HBM addresses the relationship between individual values and expectations for avoiding disease and what they expect to achieve from engaging in a healthier lifestyle, behavior, or intervention (value-expectancy theory; Boslaugh, 2013), so entry in the MIH-CP program could be perceived as an individual's activation of the health perceptions of the HBM (susceptibility, severity, benefits, barriers, cue to action, and self-efficacy; Boslaugh, 2013; Jalilian et al., 2014). In other words, a participant in the MIH-CP intervention could be aware that they may be susceptible to a serious chronic disease and is weighing the benefits and barriers of doing something or doing nothing for their NCD. This individual assessment may trigger the cue to action where they choose to enroll in the program and ideally comply with the prescribed treatments and lifestyle changes that eventually lead to self-efficacy (the belief that they can execute the necessary changes to improve their quality of life; (Bandura, 1977.; Boslaugh, 2013; Jalilian et al., 2014). The HBM has provided a valuable framework for me to better understand individual beliefs and behavior patterns in order to assess the MIH-CP intervention for changing high-risk behavior (Abraham & Sheeran, 2015).

It is not reasonable for health policy makers, healthcare providers, and human beings to sit idly by while the epidemic of NCDs bankrupt the global economy, deplete valuable resources, and cause the proliferation of misery and premature death (Allen &

Bloomfield, 2016; Milani & Lavie, 2015; Nulu, 2017; Riley & Cowan, 2015). Therefore, my conclusion is that there is a statistically significant predictive relationship that MIH-CP may increase the perceived QOL among persons with the NCDs studied in this research and upon graduation from an MIH-CP program. The potential influence of this program on CDM initiatives deserves further inquiry to promote positive social change.

By being able to intervene in the cycle between having NCDs, attempting to manage them appropriately, and negative implications to mental health and perceived QOL using programs like MIH-CP may be one of the most positive social change possibilities for these individuals and the global community. This research could be transformational. We live on a diverse global community where thoughts and solutions must be shared to promote improvements to humanity. I would like to think that my search is a step toward improving the common good of our global citizens.

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Appendix A: Kolmogorov-Smirnov Test Results

One-Sample Kolmogorov-Smirnov Test

		NCD Type	Gender	Days in MIH	MIH Days >100
N		645	645	645	645
Normal Parameters[a,b]	Mean	1.00	.54	47.77	.04
	Std. Deviation	1.203	.499	28.733	.186
Most Extreme Differences	Absolute	.280	.361	.288	.541
	Positive	.280	.322	.288	.541
	Negative	-.204	-.361	-.195	-.424
Test Statistic		.280	.361	.288	.541
Asymp. Sig. (2-tailed)		.000[c]	.000[c]	.000[c]	.000[c]

One-Sample Kolmogorov-Smirnov Test

		Hospital Readmission
N		645
Normal Parameters[a,b]	Mean	.15
	Std. Deviation	.390
Most Extreme Differences	Absolute	.506
	Positive	.506
	Negative	-.347
Test Statistic		.506
Asymp. Sig. (2-tailed)		.000[c]

a. Test distribution is Normal.

b. Calculated from data.

c. Lilliefors Significance Correction.