ASSOCIATIONS BETWEEN PHYSICAL ACTIVITY AND QUALITY OF LIFE:

IMPLICATIONS FOR PRIMARY CARE

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DOCTOR OF PHILOSOPHY

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ABSTRACT

It is increasingly well-known that chronic diseases are placing a burden on the United States, including the healthcare system. Considering chronic disease risk and quality of life (QOL) measures, improving lifestyle behaviors such as physical activity (PA) should be further explored. In particular, using a place-based approach such as the healthcare system to improve lifestyle behaviors is a strategy to explore. Lifestyle Medicine (LM) is an approach that uses behavior as therapy to treat conditions and is suggested as an approach for primary care.

The purpose of study 1 was to explore potential differences in QOL of patients who were referred to LM and are categorized into one of three groups 1) did not engaged in LM 2) engaged in up to two sessions of LM 3) engaged in three or more sessions of LM. The purpose of study 2 was to explore the relationship among provider QOL, PA level, and referral practices to LM. Participants completed demographic and lifestyle referral practices questionnaire, RAND-36 item health questionnaire, and Physical Activity Vital Sign questions.

Results from study 1 include no significant differences between LM groups, QOL, and PA. Additionally, a significant difference was found for patient general health QOL score for those who met PA guidelines ($M = 68.16$, $SD = 23.346$) versus those who did not meet PA guidelines ($M = 54.67$, $SD = 16.23$); $t(48) = 2.41$, $p = .02$.

Results for study 2 include no significant differences between provider PA minutes and LM referral as well as provider general health QOL and LM referral. A significant difference was found for provider general health QOL score for those who met PA guidelines ($M = 85.833$, $SD = 10.68$) versus those who did not meet PA guidelines ($M = 67$, $SD = 9.08$); $t(9) = 3.109$, $p = .013$.

This dissertation will further inform the healthcare community (health system and health professionals) about the importance of PA to overall QOL for patients and providers. Moving from sick care to preventive care using LM approaches must be further explored and studied for both improved health outcomes and financial sustainability.

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LIST OF ABBREVIATIONS

BMI .....Body Mass Index

CRF .....Cardiorespiratory Fitness

EIM .....Exercise is Medicine

EMR.....Electronic Medical Record

EVS .....Exercise as a Vital Sign

GDP.....Gross Domestic Product

HBM .....Health Belief Model

HMO .....Health Maintenance Organization

LM.....Lifestyle Medicine

OECD.....Organization for Economic Cooperation and Development

PA .....Physical Activity

QOL .....Quality of Life

U.S. .....United States

USPSTF .....US Preventive Services Task Force

INTRODUCTION

It is increasingly well-known that chronic diseases are placing an incredible burden on the United States (U.S.), including the healthcare system. The top ten leading causes of death reported include: heart disease, cancer, chronic lower respiratory diseases, unintentional injuries, stroke, Alzheimer's, diabetes, influenza and pneumonia, kidney disease, and suicide (Xu, Murphy, Kochanek, & Arias, 2016). For more than 10 years now, half of all American deaths are attributed to health behaviors (McGinnis & Foege, 1993; Mokdad, Marks, Stroup, & Gerberding, 2004). Health behaviors such as physical inactivity, poor diet, alcohol consumption, and use of tobacco products are the primary behaviors that lead to the chronic conditions causing the most deaths. In fact, individuals who engage in healthy lifestyles reduce their risk of experiencing heart disease by 80% and type II diabetes by 90% (Hu et al., 2001; Stampfer, Hu, Manson, Rimm, & Willett, 2000). Despite these promising health outcomes through engaging in lifestyle health behaviors, many Americans do not partake in these behaviors.

With regard to physical inactivity, nearly half (46.9%) of adults in the U.S. do not meet the minimum recommended amount of physical activity (National Center for Health Statistics, 2015a). In 2008, the Physical Activity Guidelines for Americans were developed recommending a minimal amount of aerobic and strength activities for general health (U.S. Department of Health and Human Services, 2008). Even with these guidelines, data continues to reveal that American adults are lacking in their physical activity behavior.

Complacency of many Americans related to engaging in healthy behaviors, such as physical activity, may be exacerbated by a common misconception that the U.S. is the leader in healthcare and overall health among developed countries. While the U.S. spent the most money on healthcare at an estimated $2.1 trillion in 2006 compared to other industrialized nations, the

high cost and impressive advances in medical technology are not improving the health of people in the U.S. (Schroeder, 2007). Infant mortality rates rank the U.S. 26th among Organization for Economic Cooperation and Development (OECD) countries at 6.1 deaths per 1,000 live births (Macdorman, Mathews, Mohangoo, & Zeitlin, 2014). Countries that have the lowest infant mortality include Finland and Japan at 2.3 deaths per 1,000 live births (Macdorman et al., 2014). Life expectancy from birth in the U.S. noticed a slight decrease to 78.8 years (Xu et al., 2016). In fact, people in the U.S. live shorter and less healthy lives than people in other developed countries and rank 27th in life expectancy at birth of the OECD countries (Avendano & Kawachi, 2014). These data point to a U.S. health disadvantage that starts at birth and continues through the life course.

One measure that is used to assess overall health and happiness is quality of life (QOL). Among the countries of the OECD, life satisfaction is used as a measure of overall QOL across countries. The U.S. has score of 6.9 on general life satisfaction which is slightly higher than the OECD average (Organization for Economic Cooperation and Development, 2015). Interestingly though, the U.S. scores lower than the average on social connectedness and work-life balance which are factors that can influence overall QOL.

Access to health care in the U.S. may provide part of the explanation for the reduced life expectancy but much of the contributing factors of chronic disease occur outside of medical care and in the physical and social environments of the U.S.; many Americans make poor lifestyle behavior choices related to health (Avendano & Kawachi, 2014). For example, in contrast to countries that boast higher life expectancies such as Denmark (81 years of age; higher than OECD average), where most people bike and walk as part of their daily lives, the U.S. has a built

environment that discourages active transportation while simultaneously encourages increased use of automobile transportation.

The health field concept describes four categories of health with the purpose of exploring actual causes of sickness and death in Canada (Lalonde, 1981). The four categories include: human biology, environment, lifestyle, and the healthcare organization. In a more recent publication, the health field concept was expanded and now includes five domains that impact health: genetics, social circumstances, environment, behavior, and access to medical care (McGinnis, Williams-Russo, & Knickman, 2002). The impact each domain has on U.S. premature death is as follows: genetics 30%, social circumstances 15%, environment 5%, behaviors 40%, and access to medical care 10%. This breakdown clearly shows that behaviors (lifestyle) have the greatest influence on preventable illness and death. However, one important and practical approach gleaned from the health field concept and the different categories is their interconnectedness; the healthcare system can be a conduit to improving health behaviors (McGinnis et al., 2002).

One strategy to leverage the healthcare system to improve health behaviors is the clinical use of lifestyle medicine (LM). Lifestyle Medicine is a clinical approach using therapeutic interventions to address health behaviors related to chronic conditions (Egger, Binns, & Rossner, 2009). This dissertation research aims to explore the relationship between engaging in LM services and quality of life. In addition, exploring provider behaviors, including their beliefs and likelihood of engaging in health counseling with his/her patients will be explored to better understand how to leverage the healthcare system to increase healthy lifestyle behaviors of patients.

Conceptual Framework

In order to change health behavior, many factors must first be considered including personal motivation, social situation, and organizational influences. When contemplating these factors, the Health Belief Model (HBM) is a theory used to improve the effectiveness of the behavior change process. The HBM is based on individual beliefs that a disease or condition will occur. Therefore, an individual must perceive themselves as susceptible of contracting the disease and that, if contracted, the disease is severe (Rosenstock, 1974). Then, there must be a perceived threat of disease and cues to action such as media influence, reminders for check-ups, or seeing a family member go through an illness. The likelihood of action is influenced by the individual's perceived benefits and barriers and perceived self-efficacy (Rosenstock, 1974).

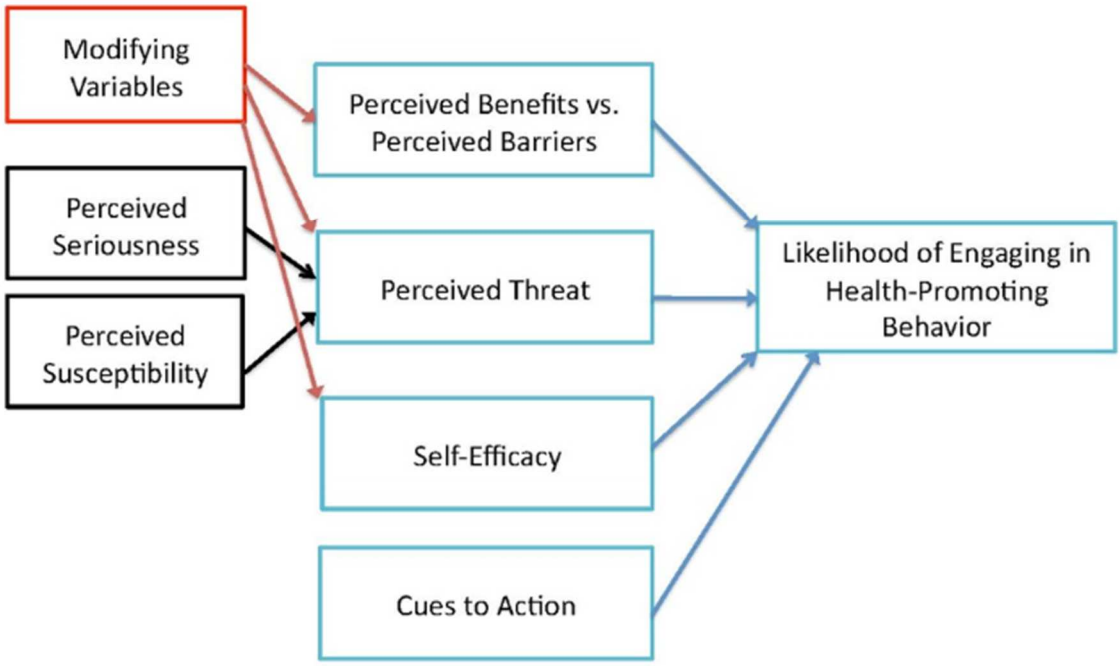

Figure 1. Health Belief Model

This theory is helpful when healthcare professionals are working with patients to change an unhealthy behavior by identifying patient concerns and addressing inaccurate information and misperceptions of disease processes. It can also help with administration of an appropriate intervention that matches the patient's perceived benefits (what is important to the person) and minimizing the perceived barriers in order to produce the best chance of a healthy action from the patient.

Merging the HBM with the Spectrum of Prevention tool further improves patient health outcomes by moving beyond patient education to involving the social context of the patient and health policy. The Spectrum of Prevention includes six levels of promoting health starting with individual knowledge and moving to the most encompassing level of policy and legislation (Prevention Institute, 2017).

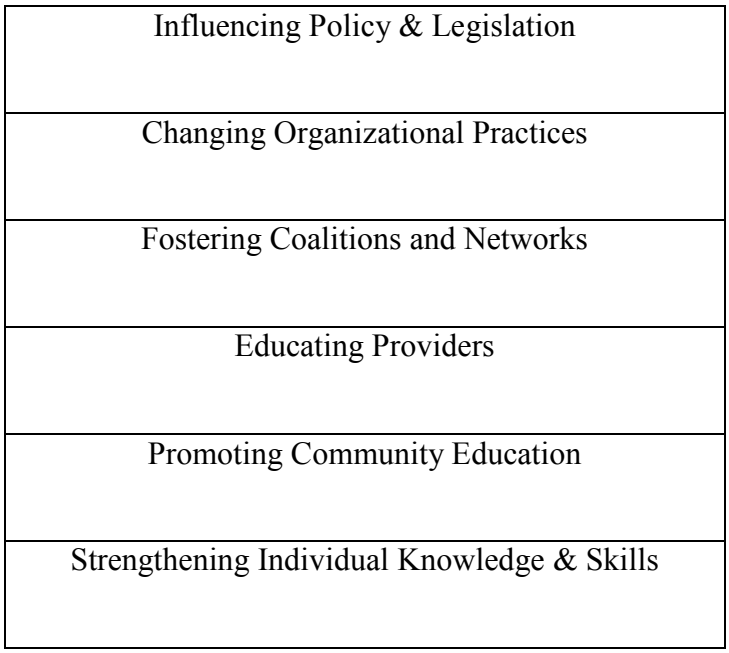

Figure 2. Spectrum of Prevention

The Spectrum of Prevention model pairs well with the HBM to influence patient health behavior through educating providers on how to approach conversations and propose

interventions. Furthermore, the Spectrum of Prevention and HBM can be used to influence the perceptions, attitudes, and behaviors of healthcare professionals related to incorporating lifestyle counseling in primary care. Figure 3 is an image of what a combination of the HBM and Spectrum of Prevention would look like. As can be seen, education for both individuals and providers is important to influence perceptions and the sense of ability to engage in health behaviors. In addition, cues to action are needed in order to change behaviors of providers such as changing Electronic Medical Record (EMR) systems and changing health policy.

Figure 3. Combined Model

In order for a patient to see a health care professional who incorporates lifestyle health counseling, access to healthcare and financial costs associated with a clinical visit must be considered. The health status of Americans is being gravely affected by chronic health conditions that are related to lifestyle health factors. Health status related to chronic diseases is explored in an effort to identify strategies to positively impact health outcomes by leveraging improvements to health systems.

Statement of the Problem

Currently, medical care and clinical practice is structured around technical (pharmaceutical) treatment of disease. Using lifestyle interventions within medical care to prevent and treat cardiovascular disease, cancer, stroke, and diabetes is not fully embraced by all healthcare professionals or integrated within health systems. Moreover, minimal options are available for treating some lifestyle health conditions such as obesity in clinical practice, and therefore, have not been prioritized by primary care providers (Schroeder, 2007). More recent recommendations for prevention and treatment of chronic disease proposes public health and healthcare systems work together by utilizing strategies addressing multiple risk factors (Bauer, Briss, Goodman, & Bowman, 2014; Cohen, Tallia, Crabtree, & Young, 2005; National Prevention Council, 2011; Steele et al., 2017).

Design and implementation of preventive approaches across multiple sectors is still being explored. Within the healthcare sector, technical fixes (e.g. pharmaceuticals, procedures, surgery) are the dominant approaches to-date, but with the high rates of preventable chronic disease and rising health care costs, the U.S. can no longer rely on technical approaches alone. Adaptive leadership by healthcare professionals is an approach that facilitates patients to respond to their health challenges and supports patients through behavior change to live a healthier lifestyle (Thygeson, Morrissey, & Ulstad, 2010). A few ways to implement adaptive leadership include using the EMR prompt and restructuring the patient visit to include more opportunities for lifestyle discussions between provider and patient. There is still more to be learned about adaptive leadership from healthcare professionals in terms of how best to engage and communicate with the patient, but this approach involves evidence-based conversation tools used by providers when engaging in difficult lifestyle health conversations (Thygeson et al., 2010).

Purpose of the Study

The purpose of the first study is to explore potential differences in QOL of patients who were referred to LM and are categorized into one of three groups 1) did not engaged in LM 2) engaged in up to two sessions of LM 3) engaged in three or more sessions of LM. Differences in QOL will be stratified by BMI and physical activity level. The purpose of the second study is to explore the relationship among provider QOL, physical activity level, and referral practices to LM.

Significance of the Study

This study is significant because the health of the American people is failing and more needs to be done to improve health status and reduce chronic disease. This study will add to the evidence of using LM as an effective approach to reduce chronic disease burden and improve quality of life using the healthcare system. In addition, this study will improve the understanding of provider behaviors, including their beliefs and likelihood to engage in health counseling or referral to LM services.

Limitations of the Study

The following are possible limitations to this study. Because the study will draw from a convenience sample, there is potential for selection bias. In addition, this study will rely on participant self-report which may include social desirability bias. Lastly, this study will be conducted with one regional healthcare system that has a LM program so results may not be generalizable to all healthcare systems.

Definition of Terms

Adaptive leadership – ability to take on the process of change in a gradual, meaningful manner

Adaptive challenges – difficult to identify and require people to use values and beliefs to solve a problem

BMI – Body mass index. Measure of weight in kilograms divided by height in meters (kg/m^2). Range of scores include four categories; underweight, normal weight, overweight, obese.

Lifestyle medicine – practice of helping patients engage in and sustain healthy lifestyles for the purpose of improving health and quality of life

Obesity – BMI measure of 25-30 kg/m^2

Overweight – BMI measure of over 30 kg/m^2

Physical activity – bodily movement caused by skeletal muscles that includes energy expenditure

Quality of life – standard of health or happiness; satisfaction with life

Self-efficacy – individual belief in ability to succeed

Technical fixes – use of technology to solve a problem

LITERATURE REVIEW

While the U.S. spent the most money on healthcare compared to other industrialized nations, an estimated $2.1 trillion in 2006, the high cost and impressive advances in medical technology are not improving the health of people in the U.S. (Schroeder, 2007). Compared to other developed countries, the U.S. spends the most money on health care per person at 16.9% of the Gross Domestic Product (GDP) (Organization for Economic Cooperation and Development, 2015). Despite higher expenditures, the increased prevalence of chronic diseases have put the increasing U.S. life expectancy in jeopardy; this generation of youth could be the first generation to not outlive their parents (Olshanksy et al., 2005). The increased prevalence of chronic disease is contributing to people in the U.S. living shorter and less healthy lives (Avendano & Kawachi, 2014). The U.S. boasts a leadership role in many areas of comparison with other industrialized nations such as military power and technical capacity of emergency health care; however, prevention of chronic disease is not one of those areas. This may be surprising because it is common for the general public to think that the U.S. is the leader in overall health and healthcare among developed countries.

In the past, minimal options have been available for treating lifestyle conditions in clinical practice and have not been prioritized by primary care providers (Schroeder, 2007). Access to healthcare and financial costs also must be considered when looking into lifestyle-related poor health conditions. History of the U.S. healthcare system, lifestyle approaches to health behaviors, and integration of LM into primary care will be explored for ways to improve health outcomes and treat disease.

United States Health System

Prior to discussing health system changes, it is important to briefly describe the history of the current health system structure and functions. Historically, and in the current system, who drives decisions, how health information is gathered, and who pays for the visit all influence patient health. Healthcare resources in the U.S. are systematically allocated in ways that do not allow for maximized health or cost control (Cantor, Mikkelsen, Simons, & Waters, 2013).

History of Healthcare

To appreciate where healthcare in the U.S. is today, a look back at major moments in history is warranted. The start of the 20th century is when the U.S. modern healthcare system became organized (The George Washington University, 2012). The American Medical Association grew to become a strong voice for influencing the direction of healthcare in the early 1900's and then about ten years later, the American Association for Labor Legislation organized and began to drive the health insurance agenda (Silverman & Demak Epstein, 2000). In the 1930's, the national health insurance agenda waivered and The Great Depression influenced national priorities; the Social Security Act was passed and private insurance (Blue Cross) was offered without additional governmental options (Silverman & Demak Epstein, 2000). Other leaders proposed national health plans that were met with opposition from private organizations until 1965 when Medicare and Medicaid was passed (The George Washington University, 2012).

The sixties was a time of social change and epidemiologic transition for the U.S. Infectious diseases were being managed and chronic conditions such as heart disease and cancer were growing issues for the health system (Stevens, 1996). More emphasis was being placed on biomedical research and specialty medicine and the pharmaceutical industry was changing how conditions were treated (Silverman & Demak Epstein, 2000; Stevens, 1996). Using technology

to restart a heart and kidney transplants were exciting realities happening during this time. This also meant that chronic conditions would start to burden the health system both in cost and available facilities; such as increased need for long-term care and rehabilitation services (Stevens, 1996).

Under President Nixon, Health Maintenance Organizations (HMO's) took the U.S. further in the direction of private insurance (The George Washington University, 2012). Health Maintenance Organizations operate using a flat rate at which the healthcare provider needs to deliver all necessary services. Whereas, private insurance was set up in a fee-for-service structure. In the 1980's, Medicare changed its payment criteria from payment by treatment to payment by diagnosis and private insurance companies followed (Silverman & Demak Epstein, 2000). This change meant that a diagnosis came with a pre-set price tag indicating what and how much would be reimbursed by Medicare (Korcok, 1983). For example, a hernia repair will be a different rate than an organ transplant, but they would both have a set rate of reimbursement. This change caused systems to more closely evaluate their costs and possibly to defer un-met Medicare reimbursement to private payers. Quality of care began to be scrutinized during this time (Korcok, 1983).

Medicare was designed and implemented to help vulnerable, older Americans and move closer to equal opportunity but it ended up overshadowing some of the larger issues including providing healthcare resources for all Americans (Stevens, 1996). Healthcare has continued to focus on specialized medicine instead of primary care into present day and both government and private insurance plans are worried about being able to sustain the cost trajectory of health care long-term (Silverman & Demak Epstein, 2000). President Obama led the most recent change to healthcare in the U.S. through the Patient Protection and Affordable Care Act (ACA) in 2010

which was designed to increase the number of Americans with health insurance (The George Washington University, 2012). It appears, based on the history, that a focus on lifestyle and behavioral factors that could prevent disease have never really been a priority in the healthcare system structure.

Organizational/Decision Makers

Patients want to be have good health; therefore, it seems logical that they want to be invested in their care and the decisions made for their health. This involvement in personal healthcare is complicated, however. In order for patients to be involved in health decisions, it is helpful for them to be informed about conditions, communicate their personal values, and feel empowered to make decisions (Joseph-Williams, Elwyn, & Edwards, 2014).

Patients do want to have preventive health discussions with their provider (Wolff et al., 2010). In order to have conversations about prevention with patients, providers need to adapt their practices from diagnosing and treating all conditions as acute problems to facilitating behavior changes among their patients. Providers may not be comfortable using this approach due to lack of training. However, it is important for the provider to take ownership for having productive conversations and using evidence-based practices for mobilizing patient behavior change (Thygeson et al., 2010). Physician attitudes toward behavior change discussions in primary care are mostly favorable, but the healthcare system in which they practice is oftentimes prohibitive (Bardach & Schoenberg, 2012).

Previous literature supports the notion that healthcare providers provide patients with advice for their health (Bardach & Schoenberg, 2012; Wolff et al., 2010). Health professionals are trained to utilize evidenced-based interventions in their practice. However, there is some question and resistance from health care professionals regarding the use of evidence-based

protocols that recommend the use of lifestyle intervention prior to prescribing medication for conditions such as high cholesterol and pre-diabetes. Providers often lack education and training in lifestyle therapies. In addition, many providers believe these evidence-based interventions are more expensive, slow to produce results, and that their patients just want a quick fix. A recent study explored the use of non-evaluated interventions and evidence-based interventions used by health professionals (van de Glind et al., 2015). Non-evaluated (not evidence-based) interventions were not less complicated to administer nor did they produce better outcomes than evidence-based interventions. The question still remains why health professionals use non-evaluated interventions; studying this question is needed to help increase use of evidence-based programming that ultimately improve health outcomes, especially if there is minimal patient involvement in decision making (van de Glind et al., 2015).

Electronic Medical Record/Vital Signs

A relatively recent change in health system functions includes the wide-spread use of electronic medical records (EMR) in place of paper charts. Features of EMR are being explored for patient data collection and health conversation prompts. One EMR system, eLinkS, was implemented in a health system for all types of office visits. This system prompted clinicians to ask patients specific questions which improved discussions around counseling for unhealthy behaviors (Krist et al., 2008). The system improved clinician engagement and thus patient willingness and openness to discuss and engage in health concerns (Krist et al., 2008). The use of EMR also has been identified as a system improvement to help providers better manage their patient load and long-term patient health (Bardach & Schoenberg, 2012). By having a system that both prompts for lifestyle discussion points, such as physical activity level, and allows for

logging of patient-provider discussions there is increased opportunity for prevention in primary care.

Kaiser Permanente is a health system that uses EMR, and more specifically, has a program that lists exercise as a vital sign (EVS). Similar to the outcomes found from Krist et al. (2008), the health professionals using the Kaiser health system found that through capturing EVS, the health record served as a conversation starter with the patient and led to appropriate community referrals (Grippo, Rogers, & James, 2012). Kaiser Permanente is making exercise as important as other vital signs (e.g. temperature, pulse) and facilitates tracking for patient physical activity over time and monitoring by clinicians to assess progress (Grippo et al., 2012).

Vital signs are defined by Merriam-Webster's dictionary (2017) as essential body functions measured to assess health. Traditional vital signs include respiration rate, blood pressure, pulse, and temperature; height and weight are also measured to calculate body mass index (BMI), and most recently an assessment of pain. Neither BMI or pain have been officially endorsed as a "fifth vital sign" (The Joint Commission, 2017). Smoking status (now tobacco use) is the closest measurement to a fifth vital sign that is in current practice. At the end of the 20th century, the case was being made to make smoking status a vital sign in clinical practice (Fiore, 1991). Due to the health problems that had been documented over the previous 40 years by using cigarettes and tobacco-products, an action plan to address the behavior was being formed and included to assess and address smoking behavior in the clinical setting. The rationale behind these clinical actions are due to the belief that if it was part of the vital signs, there would be increased likelihood of intervention (Fiore, 1991). While the Joint Commission (2017) may not endorse pain as a vital sign, historically, accreditation standards had included pain as a

measurement that should be assessed for all patients and some organizations (e.g. VA) made a procedural change to include it with their vital sign measures.

Using EVS is appropriate to better provide a measurement of health behavior that could be used to prevent disease development. In fact, it has been suggested that using patient self-reported health status could improve the conversation between the patient and health professional (Meurer, Layde, & Guse, 2001). Discrepancies in patients' perceptions of their health and actual health status could increase motivation of the healthcare provider to engage in lifestyle conversations. Due to the value of self-reported health status and health, some recommend including it as a vital sign (Meurer et al., 2001).

Using EVS has the potential to provide data on the relationships among exercise and healthcare use, cost, and chronic disease that has not been previously available at the population level (Coleman et al., 2012). Data from the Aerobics Center Longitudinal Study has been used over the past two decades to identify predictors of mortality. Physical activity, smoking, and diagnosis of chronic disease were reviewed over multiple studies to identify risk of mortality. One particularly significant finding is that cardiorespiratory fitness (CRF) was found to be an independent predictor of all-cause mortality (Wei et al., 1999). In fact, while controlling for the other variables, low CRF predicted more excess deaths from all causes than blood pressure and tobacco use. While the current healthcare system gathers weight and blood pressure measurements, and assesses for tobacco use at each visit, which can be helpful to identify patient risk factors, it does not capture a fitness measurement. EVS could be used as a proxy for fitness assessment, which could have substantial impact on chronic disease prevention and management knowing that fitness, independent of fatness, blood pressure, and tobacco use, predicts risk of death.

Self-report questionnaires National Health and Nutrition Examination Survey (NHANES) and Behavioral Risk Factor Surveillance System (BRFSS) were used as a comparison to the self-report of EVS in the clinical setting. Patients self-reported less exercise when clinicians used EVS than those who completed the self-report NHANES and BRFSS instruments (31% vs. 60% and 50% respectively) (Coleman et al., 2012). Furthermore, patients with a comorbidity score of three were 1.54 times more likely to report being inactive. It could be that patients are more honest when having a face-to-face conversation about their lifestyle with their healthcare provider which is one explanation for the lower level of exercise reported using EVS. However, if the EVS question is not asked, does the patient offer the information without prompting? Using EVS can be an important tool for health promotion within the healthcare setting (Coleman et al., 2012; National Physical Activity Plan Alliance, 2016).

Other more objective measures of physical activity, such as Fitbit®, are not realistic as a national approach to patient care due to their cost and reliance on patient follow-through to consistently wear them. Using self-report measures that are accurate, such as EVS, offer a more realistic and systematic approach to integrating lifestyle assessment and promotion into primary care. Overall, capturing health behavior data was found to be feasible in the clinical setting and an avenue to address behavior change (Fernald et al., 2008). While there are current United States Preventative Services Task Force (USPSTF) recommendations for obesity screenings and referrals to behavioral interventions for patients who are overweight and have other cardiovascular disease risk factors, it is up to the provider and insurance carrier to define medical necessity (U.S. Preventive Services Task Force, 2017). Medical necessity is defined as healthcare services that are appropriate for evaluation and treatment of condition as well as being consistent with standard of care; necessity is identified on a case-by-case basis (American

College of Medical Quality, 2010). The subjectivity of medical necessity causes confusion especially when related to prevention in primary care. Medicaid coverage differs by state in the U.S. and some preventive services such as behavioral counseling and health education may not be reimbursed outside of a general office visit (Wilensky & Gray, 2012). Furthermore, Medicare and private insurance carriers have different definitions of covered behavioral counseling sessions for overweight and obesity as well which adds to the confusion within the primary care setting. Adapting consistent, evidence-based guidelines for lifestyle-related health concerns in primary care is needed. Insurance coverage of these evidence-based strategies is also needed in order to ensure their use by providers within primary care settings.

Payment/Reimbursement

The lack of an appropriate primary care payment strategy is a barrier to healthcare in the U.S. (Green, Cifuentes, Glasgow, & Stange, 2008). The current U.S. healthcare payment system has been scrutinized for some time now with changes beginning to happen at a more measureable rate with the ACA. Pay-for-performance is one change that has been recommended and implemented in some health systems, but results have shown little to no improvement in quality of care (James et al., 2012; Jha, Joynt, Orav, & Epstein, 2012; Ryan, Burgess, Pesko, Borden, & Dimick, 2015). The idea is that providers are paid based on patient outcomes instead of number of visits. When incorporating a values approach, quality improvement is considered as well as the use of financial penalties to the health system. A concern with this model is that it may actually worsen racial and ethnic disparities because providers could avoid seeing patients who have more complicated conditions or do not have the perceived means to improve their health which would in turn punish the provider financially. Pay-for-performance also promotes a narrow set of outcome measures focused around technical solutions instead lifestyle changes.

More research is needed on longer-term evaluation of the possible effectiveness of pay-for-performance systems (James et al., 2012).

Other value-based pay-for-performance approaches that are used by Medicare and some hospital systems have been studied with mixed results as well (Baker Institute, 2014; Ryan et al., 2015). The Veterans Affairs (VA) Administration found incentives could be part of an overall system approach to improve (Baker Institute, 2014). However, once the incentive was removed, the positive outcome could not be sustained. In a long-term study over a period of six years, Medicare data showed no evidence that pay-for-performance decreased 30-day mortality and outcomes did not differ significantly between systems linked to incentives and those that were not (Jha et al., 2012). Pay-for-performance success seems somewhat dependent on how or what are the defined performance measures. For example, if blood pressure control is a performance outcome and medication management can be used to meet that outcome then the metric is met but patient health outcome over-time may not be.

Another approach to healthcare payment is to use the current procedural terminology (CPT) codes that exist for preventive care services to allow for insurance coverage (Segal, Rayburn, & Martín, 2016). Also, by working with the USPSTF on their recommendations, a grade B or higher recommendation for specific preventive or behavioral treatments should be explored as insurance coverage is mandated at no additional cost (Segal et al., 2016). Recent research has identified clinician disincentives to using a lifestyle approach over surgeries and other treatments based on what is reimbursed by insurance (van de Glind et al., 2015). Including reimbursement for proven interventions using allied professionals such as community health workers is one way to work within the current insurance reimbursement system (National Physical Activity Plan Alliance, 2016; National Prevention Council, 2011).

Another suggestion is for the healthcare system to engage in an outcomes-based payment system while using LM to allow for society to realize savings with these approaches (Guthrie, 2017). Healthcare systems that successfully implement LM will be positioned to be the most successful in reducing costs and witnessing meaningful health changes in the future (Guthrie, 2017). Lifestyle Medicine uses a healthcare team approach that includes providers, exercise specialists, dietitians, health coaches, and nurses. The focus is to use food, physical activity, tobacco cessation, stress management, and social relationships as focused approaches to prevent and treat disease in the clinical setting (Rooke et al., 2012). In practice, there is wide variability in what is included in LM programs and approaches. To support a LM approach, research suggests payment approaches that are more encompassing of a multidisciplinary healthcare team need to be utilized (Bodenheimer, Chen, & Bennett, 2009). Using a team approach to patient care would require major insurance payment reform.

Lifestyle as Treatment

When studying lifestyle interventions in comparison to standard medical treatment, lifestyle is shown to improve disease prognosis (Diabetes Prevention Program Research Group, 2002; Dunn, Trivedi, Kampert, Clark, & Chambliss, 2005). In a study with participants diagnosed with mild-to-moderate major depressive disorder (MDD), aerobic exercise was found to be an effective treatment with results including a 47% reduction in depression screening scores which is comparable to other depression treatments including medication and cognitive behavioral therapy (Dunn et al., 2005). Johansen et al. (2017) recently reported results of a diabetes study that included change from 6.65% to 6.35% in $HbA1_c$ after 12-months in the lifestyle group and 6.74% to 6.66% in standard care group. In addition, 47 participants (73.5%) in the lifestyle group reduced their use of glucose lowering medication compared to 9

participants (26.4%) in the standard group (Johansen et al., 2017). Improvement in biomedical indications and medication reductions are support for using lifestyle intervention as chronic disease treatment.

One landmark study comparing lifestyle intervention with use of metformin medication as treatment for pre-diabetes found that the lifestyle intervention reduced incidence of diabetes by 58% while the use of metformin only reduced incidence by 31% as compared to the control (Diabetes Prevention Program Research Group, 2002). Lifestyle modification was more effective than metformin so much so that the study was stopped early due to evidence of the lifestyle group being superior in outcome. Currently, the Diabetes Prevention Program (DPP) is being systematically integrated into healthcare systems and community wellness centers. In fact, in 2018 Medicare will start reimbursing for the DPP using a performance-based approach in which the performance outcome results from a healthy lifestyle behavior.

In another study with Medicare-aged patients, a simulation model was used to compare effectiveness of interventions to improve health outcomes (Li, Kong, Lawley, & Pagán, 2014). Participants who were part of a lifestyle program designed to increase fruit and vegetable consumption and physical activity were compared with non-program participants. Significant reductions in the number of patients with diabetes was found with the intervention over 3-5 years follow-up. Also, a significant reduction was found in the patient population living with high cholesterol over five year's follow-up (Li et al., 2014). Using this type of model can help primary care providers identify patients who need to be targeted for interventions. It is also effective in evaluation of health outcomes for different interventions in the primary care setting. However, these types of models are dependent on payment and reimbursement systems that recognize lifestyle as treatment (Li et al., 2014).

Lifestyle factors, including physical inactivity, have been associated with reduced quality of life among many different health conditions (Bize, Johnson, & Plotnikoff, 2007; Blanchard, Courneya, & Stein, 2008; Eriksson et al., 2010). In a longitudinal study in a primary care setting, patients at risk for cardiovascular disease were randomly assigned to either standard care or standard care with lifestyle intervention that included exercise and diet components. Significant differences between groups were found in quality of life using the SF-36 physical component showing lifestyle improves quality of life measures compared to standard primary care approaches (Eriksson et al., 2010). When considering cancer survivor quality of life, survivors who engaged in healthy lifestyles related to diet, physical activity, and smoking status had higher quality of life scores using the RAND-36 tool (Blanchard et al., 2008). The strongest association was found between quality of life and survivors who met the physical activity guidelines.

In the general population, an association was found between physical activity and quality of life using the SF-36 tool (Bize et al., 2007; Vuillemin et al., 2005). In fact, previous research suggests that there is a dose-response relationship between quality of life and physical activity behavior. In a study of the French general population, meeting the physical activity guidelines for health was associated with higher quality of life scores (Vuillemin et al., 2005). These results provide additional support for increasing physical activity behavior to improve health outcomes not only when considering chronic disease risk but also for improving quality of life.

Obesity is another lifestyle-related condition contributing increasing burden on the U.S. healthcare system. It is well-known that overweight and obesity are at high rates and current approaches to reduce these rates have not been successful. Cancer is a chronic condition that is associated with overweight and obesity. At least 13 types of cancer have been found to be associated with overweight and obese conditions and these cancers account for 40% of all

cancers diagnosed (Steele et al., 2017). Lifestyle factors such as engaging in physical activity and eating a healthy diet are directly related to overweight and obesity status. Healthcare providers should screen for obesity and provide interventions to address these lifestyle behaviors with a goal of reaching a healthy weight in order to reduce the cancer and other chronic diseases burden (Steele et al., 2017). There is not a systematic norm for how to use the weight measurement or BMI data nor is there an intervention practice that is supported for patients who present with overweight or obesity.

There are programs and systems already established to help integrate lifestyle behaviors into the clinical setting for use as treatment. Exercise is medicine (EIM) was developed on the foundation that physical activity should be a regular inclusion in health information gathered as it is a key behavioral factor in the prevention and treatment of diseases (American College of Sports Medicine, 2017). Through EIM, providers have access to tools, are encouraged to use physical activity as part of a treatment plan, and are encouraged to refer patients to exercise professionals (American College of Sports Medicine, 2017). System approaches used in EIM include prescription pads for exercise, or in the era of EMR adding exercise prescriptions to the formulary used. Depending on location within the community of the health care facility, partnerships with local fitness centers to serve as places to "fill" the exercise prescription may be developed. Community partnerships and interventions like this are examples of a practical LM approach.

Lifestyle Medicine is a clinical approach using therapeutic interventions to address health challenges primarily around chronic conditions (Egger et al., 2009). Recent analysis of risk factors and multiple chronic conditions (MCC) revealed a dose-response connection in that every increase in number of risk factors linearly increased the likelihood of MCC (Adams, Grandpre,

Katz, & Shenson, 2017). An alarming percentage of respondents reported having at least one chronic condition (71.5%) and with MCC making up a large portion of the U.S. healthcare costs, addressing lifestyle in the clinical setting has the potential to substantially impact healthcare costs (Adams et al., 2017).

Integration of Lifestyle Medicine into Primary Care

In a report from the National Prevention Council (2011) written to guide the U.S. in effective and achievable means of improving health, it was stated that healthcare systems should support the integration of prevention into healthcare professional training. In addition, cross training of health professionals so team members better understand one another's work, should occur to ensure prevention strategies are implemented. The National Prevention Council's recommendation is that all people should receive appropriate preventive care in clinical settings which are also supported by community resources and environments where people live out their daily life. This recommendation has been supported by other healthcare system research as well (S. M. Smith, Soubhi, Fortin, Hudon, & O'Dowd, 2012). Healthcare system interventions developed to target a specific risk factor were most likely to be effective while interventions not linked with a healthcare system were less likely to be found effective (S. M. Smith et al., 2012). For example, when working with patients with multiple comorbidities, it can be helpful to focus on a specific risk factor such as obesity or high blood pressure within the health system. A team approach requires moving beyond educating patients such as using informational handouts or factsheets. While these types of decision aids can be helpful in the decision making process, they are not sufficient to engage the patient in shared decision making with the clinical provider (Joseph-Williams et al., 2014).

Support has been shown for treating patients using lifestyle approaches in a clinical setting for smoking, nutrition, physical activity, screening for diseases, and counseling (Fernald et al., 2008; Green et al., 2008; Segal et al., 2016). This type of approach was also supported in treating patients with more than one health risk factor (Fernald et al., 2008). However, using lifestyle as treatment will necessitate a change in the current healthcare model. For example, prescriptions for healthy food and physical activity would become a normal component in healthcare operations. Another example includes comprehensive programs that involve allied health professionals such as exercise specialists as part of group sessions with providers (Segal et al., 2016). Clinical referrals to external programs are also a systematic approach using lifestyle to treat disease which includes provider engagement (Krist et al., 2008).

Healthcare system engagement is one component of a place-based approach. Healthy places, or settings, is part of the global strategy "Health for All" developed by the World Health Organization (World Health Organization, 2017). This approach is based on the belief that the place or social context in which people live their daily lives interacts with their personal and greater environmental factors to impact health (World Health Organization, 2017). By using the healthcare system in a place-based approach, community resources are capitalized, community health needs assessments are better utilized, and new healthcare models such as accountable health or accountable care organizations (ACO) and medical homes are strategies toward greater health impact (Segal et al., 2016). The concept of an ACO is when a group of healthcare providers come together to coordinate care for improved health outcomes and reduced costs based on reimbursement of quality metrics (Cantor et al., 2013). There is also an example of an Accountable Care Community such as Akron, Ohio. In Akron, improved health is measured

across the community including cost effectiveness and cost savings in the healthcare system, patient satisfaction, and jobs (Cantor et al., 2013).

Two other examples of health systems that are working to integrate lifestyle into primary care include Intermountain Healthcare, Utah and Lake Region Healthcare, Minnesota. Intermountain Healthcare is a health system that places focus on "upstream" factors such as the access or lack of access a patient may have to the things they need to be healthy (Intermountain Healthcare, 2017). Intermountain recently integrated their mental health services directly into primary care. They also partner with community organizations to help prevent chronic diseases which is a strategy recommended by the National Prevention Council (2011). This health system also operates a Live Well program designed to teach and support people to live a healthy life (Intermountain Healthcare, 2017). Lake Region Healthcare has implemented a LM program into their primary care services (Schulz & Erickson, 2016). Their program focuses on taking a preventive approach to decrease disease risk through behaviors of healthy eating, physical activity, and reducing stress. A specific example of this is the Lake Region Takes Root community garden that provided over 9,000 pounds of produce of which went to area food shelves and participants of the Women, Infants, and Children (WIC) program. Lake Region is working on reducing healthcare costs by moving to a value-based care model (Schulz & Erickson, 2016). Value-based care is based on three outcomes; better care, better health; and lower costs (Centers for Medicare and Medicaid Services, 2017). In addition, value-based care uses financial incentives for healthcare providers based on the quality of patient care.

Recent data from the National Health Interview Survey indicated that over 81% of U.S. adults had a minimum of one office visit with a healthcare professional in the past 12 months (National Center for Health Statistics, 2015b). Furthermore, over 68% of U.S. adults had contact

with their healthcare professional in the past 6 months (Centers for Disease Control and Prevention, 2015). Most adults visit with a healthcare professional on a relatively frequent basis. These contacts with a healthcare professional provide opportunities within the clinical setting to utilize preventive strategies and lifestyle as treatment. The type of visit and patients' conditions are also important. Many physician visits are focused on the adults age 45 and older who are living with chronic conditions such as hypertension and diabetes (Cherry, Lucas, & Decker, 2010).

While there is support and multiple options for how to integrate lifestyle approaches in primary care, significant changes in attitudes and behaviors are needed by healthcare professionals, medical school training, and healthcare organizational leadership before systematic action will be seen (Joseph-Williams et al., 2014). However, healthcare professionals' behavior related to providing LM as a clinical approach to address chronic health conditions is not well understood (Perkins et al., 2007). Research utilizing theories such as the HBM and the Spectrum of Prevention model is needed to understand healthcare professionals' practice norms and attitudes toward providing LM as a component of patient care. Ultimately, physicians need to become champions for population health (Schroeder, 2007). Currently, healthcare professionals do not provide preventive care in a manner consistent with clinical guidelines in spite of strong patient support for preventive care (McElwaine et al., 2013). The reasons for the challenges of underutilization of preventive care are related to the primary drivers of the U.S. healthcare system, which are insurance payers and a market approach. The type of care provided is also driven by who will pay and how much the payment will be. In a system designed to treat disease, payment is often connected to prescriptions, medical tests, or treatments ordered by the provider and not necessarily lifestyle behavior changes of the patient. The healthcare system has

a history of enabling technical solutions when adaptive approaches to behavior change would create increased benefit for lifestyle health conditions (Thygeson et al., 2010).

Gaps in Current Literature and Importance of Further Research

The health of the American people is strongly influenced by behavioral factors, yet the healthcare system is designed to treat the symptoms resulting from engaging in poor lifestyle behaviors, rather than preventing disease from occurring in the first place. A more preventative approach needs to be taken in the U.S. with healthcare and public health systems (Mokdad et al., 2004). In order to move to a more preventative approach, providers must be supported to adopt primary prevention approaches with patients. A few ways to facilitate this support is through professional development and healthcare practice changes (McElwaine et al., 2013). In addition, healthcare systems changes need to include how care is organized and paid for and how the current structure is impacting population health (Bauer et al., 2014). Recommendations include using insurance coverage for obesity prevention and treatment that include counseling and other behavioral interventions, better utilization of the EMR, and further exploration of clinical treatment and public health strategies (Segal et al., 2016). More research is needed to refine measurement tools and understand the clinical significance of the data gathered as well as the emphasis on how to best use the information (Bauer et al., 2014; Fernald et al., 2008).

Additional research is warranted to explore the structure of clinical appointments, including the amount of time needed to address preventative care (Joseph-Williams et al., 2014). For example, conducting group visits is a viable strategy for the future, though cultural differences and nurturing patient-centered experiences within a group format are important considerations (Dysinger, 2013).

It is important to continue implementing and assessing preventive approaches within health systems, in particular, using the LM approaches (Egger et al., 2009). Lifestyle Medicine is not new and it is not an alternative form of medicine, but it does require the provider to approach the practice of the medicine differently. Providers must possess a detailed understanding of their patients' underlying health habits and health risks (Dysinger, 2013). Providers' prescriptions should include more lifestyle interventions with health behavior-change skill set that includes counseling. Healthcare professionals practicing LM who engage in healthy lifestyles themselves serve as role models for their patients. In addition, healthcare professionals engaged in the community are able to champion changes to the cultural and environmental factors that facilitate lifestyle behaviors such as healthy nutrition, physical activity, and social connectedness (Bauer et al., 2014; Dysinger, 2013; National Physical Activity Plan Alliance, 2016).

Recent literature describes that physician behavior and perceptions influence how, or even if, the physician engages in physical activity counseling with the patient (Behrens & Harbour, 2014). More specifically, provider physical activity level has been shown to influence provider choice to engage in behavioral counseling with patients. Aspects of the healthcare environment should be further studied for specific influences of individual provider health behavior, provider-patient communication, and peer provider influence (Behrens & Harbour, 2014; Honda, 2004; Thygeson et al., 2010). The healthcare system environment must be structured in a way to support behavioral counseling; therefore, more research is needed to explore what factors most influence patient-provider communication and ultimately preventive care (Honda, 2004).

There seems to be evidence of healthy lifestyle behaviors positively influencing quality of life yet Americans are not changing their behavior. Innovative approaches need to be explored

to better assist patients with their lifestyle choices within the U.S. healthcare system. Outcome measures related to behavior change, such as quality of life, is another piece for consideration within the healthcare system.

Summary

The challenges of healthcare system change are evident through the history of national healthcare priorities influenced by the free market and political agenda. As a relatively young country still, the U.S. has a strong history of individual approaches and freedoms which includes healthcare access and quality. As was described in this literature review, there is a disconnect between the lifestyle behaviors that are known to lead to a healthy life and reduced chance of developing chronic disease, and the lifestyle behaviors that are engaged in and supported by the systems and environments in which Americans live which have led to chronic diseases and disabilities.

The current healthcare approach cannot be financially sustained and new approaches must continue to be introduced. Moving from sick care to preventive care using LM approaches must be further explored and studied for both improved health outcomes and financial sustainability. The healthcare system must change its focus from immediate cost containment to long-term investment for long-term health outcomes (Bardach & Schoenberg, 2012). Conducting additional research in support of a positive association between physical activity and health-related quality of life could provide motivation for patients and healthcare providers to use exercise as medicine (Bize et al., 2007). Considering both chronic disease risk and quality of life measures, improving lifestyle behaviors such as physical activity, should be further explored for how to best to increase these behaviors and using a place-based approach such as the healthcare system is one avenue to further explore.

METHODOLOGY

Study 1

The purpose of this study was to explore potential differences in QOL of patients who were referred to LM and are categorized into one of three groups 1) did not engage in LM 2) engaged in up to two sessions of LM 3) engaged in three or more sessions of LM. Differences in QOL will also be stratified by patient self-reported physical activity level.

Study Design and Protocol

Patients who were referred to LM between October 1, 2016 and September 30, 2017 were contacted and asked to participate. Patients were mailed an informed consent (*Appendix A)* which served as an invitation to participate in the study along with a coded demographics question set (*Appendix B)*, QOL questionnaire (*Appendix E),* and physical activity vital sign (PAVS) questions (*Appendix F)* to ensure anonymity of responses but also allow for returned questionnaires to be tracked. Questionnaires were mailed in health system envelopes from the health system as a strategy to potentially increase participation. In addition, participants were given a free LM visit from the healthcare system which was offered through the informed consent document. Questionnaires were mailed March 1, 2018 and a second wave mailed out March 28, 2018. All responses received by April 16, 2018 were included in the study.

Participants

Participants included primary care patients who had the opportunity for referral to LM at a regional healthcare system. To be included, participants were between the ages of 18-89. Total number of eligible participants was 213. Patients were grouped by volume of LM visits so that QOL response and PA behavior could be analyzed by group.

Measures

Demographics. In addition to the self-reported patient demographic question set, age, gender, primary care physician name, and number of LM visits were gathered from the health system directly.

RAND-36 Item Health Questionnaire. Quality of life was measured using the previously validated and frequently utilized RAND-36 tool (R.D. Hays, Prince-Embury, & Chen, 1998; Ron D Hays & Morales, 2001). The RAND-36 questionnaire consists of 36 questions within eight health domains: physical functioning, role limitations caused by physical health problems, role limitations caused by emotional programs, social functioning, emotional well-being, energy/fatigue, pain, and general health perception.

Physical Activity Vital Sign. The two questions of the PAVS measure were used to assess patient physical activity level. This tool was developed for the Exercise is Medicine ® program and is a tool in the healthcare providers action guide (American College of Sports Medicine, 2018).

Data Analysis

Data was analyzed using SPSS version 24. Alpha levels for all tests of significance were set at $p < 0.05$. Preliminary analyses, consisting of descriptive statistics of age, ethnicity, education level, marital status, income, and gender are presented. Shapiro-Wilk tests for normality were performed to evaluate the distribution of responses. Correlations between QOL scales, LM visits, and PA minutes were determined using Pearson correlation coefficient.

To test for any potential mean differences between LM visit groups, one-way ANOVA was used with both number of LM visits and appropriate QOL scales as dependent variables. For variables not normally distributed, the Kruskal-Wallis test was used. In addition, an independent

samples t-test was run to determine if mean general health QOL score differed between patients who met PA guidelines and patients who did not. Forward selection was used to determine the best linear regression model fit for both total PA minutes and general health QOL and Chi-square tests of association were used to test for associations between education level and meeting PA guidelines as well as LM visits and meeting PA guidelines.

Study 2

The purpose of the second study was to explore the relationship among provider QOL, provider PA level, and referral practices to LM.

Study Design and Protocol

The investigator attended a provider meeting in February 2018 and invited providers to participate in the study. At this meeting, providers were given an informed consent (*Appendix C*), demographics question set (*Appendix D)*, QOL questionnaire (*Appendix E*), and PAVS questions (*Appendix F*). All responses were collected the day of the meeting.

Participants

Participants included primary care providers at a regional healthcare system who have access to a LM program as part of the health system.

Measures

Demographics. Providers completed self-report demographic questions including gender, ethnicity, number of years in medical practice, area of medical training, number of patients typically seen per day, and questions related to patient-provider lifestyle behavior approaches and LM referral practices.

RAND-36 Item Health Questionnaire. Quality of life was measured using the previously validated and frequently utilized RAND-36 tool (R.D. Hays et al., 1998; Ron D Hays & Morales,

2001). The RAND-36 questionnaire consists of 36 questions within eight health domains: physical functioning, role limitations caused by physical health problems, role limitations caused by emotional programs, social functioning, emotional well-being, energy/fatigue, pain, and general health perception.

Physical Activity Vital Sign. The two questions of the PAVS measure were used to assess provider physical activity level. This tool was developed for the Exercise is Medicine ® program and is a tool in the healthcare providers action guide (American College of Sports Medicine, 2018).

Data Analysis

Data was analyzed using SPSS version 24. Alpha levels for all tests of significance were set at $p < 0.05$. Preliminary analyses, consisting of descriptive statistics of gender, ethnicity, area of medical training, and questions related to patient-provider lifestyle behavior approaches and LM referral practices are presented. Pearson correlations were calculated to evaluate the relationships between QOL concepts, minutes of weekly physical activity, and strategies used to address patient lifestyle. In addition, an independent samples t-test was used to test for any significant differences in average general health QOL score between providers who met PA guidelines and those who did not.

STUDY 1

Introduction

Life expectancy from birth in the U.S. decreased slightly from 78.7 to 78.6 years (Xu et al., 2016). In fact, people in the U.S. live shorter and less healthy lives than people in other developed countries and rank 27th in life expectancy at birth of the OECD countries (Avendano & Kawachi, 2014). The U.S. has a score of 6.9 out of 10 on general life satisfaction, which ranks in the middle third of OECD countries (Organization for Economic Cooperation and Development, 2015). Life satisfaction is used as an indicator of overall quality of life (QOL), which is a measure used to assess health and happiness. Interestingly though, the U.S. scores lower than average on social connectedness and work-life balance, which are factors that influence overall QOL. In the general population, an association was found between physical activity (PA) and QOL using the SF-36 tool (Bize et al., 2007; Vuillemin et al., 2005). More specifically, it is suggested that there is a dose-response relationship between QOL and PA behavior (Vuillemin et al., 2005). These results provide additional support for increasing PA behavior to improve health outcomes not only when considering chronic disease risk, but also for improving QOL.

Chronic diseases place an incredible burden on the United States (U.S.), including the healthcare system. For more than 10 years now, half of all deaths in the U.S. are attributed to health behaviors (McGinnis & Foege, 1993; Mokdad, Marks, Stroup, & Gerberding, 2004). Health behaviors such as physical inactivity, poor diet, alcohol consumption, and use of tobacco products are the primary behaviors that lead to the chronic conditions causing the most deaths. In fact, individuals who engage in healthy lifestyles reduce their risk of experiencing heart disease by 80% and type II diabetes by 90% (Hu et al., 2001; Stampfer et al., 2000). Despite these

promising health outcomes through engaging in lifestyle health behaviors, many Americans do not partake.

In order to positively influence health, the health field concept and its domains provides a helpful foundation. The health field concept originated in Canada, identified four domains-genetics, environment, behavior, and access to health care, and was later expanded to include a fifth domain-social circumstances, that affect health (McGinnis et al., 2002). The impact each domain has on U.S. premature death is as follows: genetics 30%, social circumstances 15%, environment 5%, behaviors 40%, and medical care issues 10%. This breakdown clearly shows that behaviors (lifestyle) have the greatest influence on preventable illness and death. However, the important practical approach to be gleaned from the health field concept and the different domains is that the domains are interconnected; the healthcare system can be a conduit to improving health behaviors (McGinnis et al., 2002).

Conceptual Framework

In addition to the health field concept, personal motivation and social situation must be considered. When considering human motivation, the Health Belief Model (HBM) is a theory used to improve the effectiveness of the behavior change process. The HBM is based on an individual's perceptions. Therefore, an individual must perceive him/herself as susceptible to contracting the disease and that, if contracted, the perception that the disease is severe (Rosenstock, 1974). In addition, the individual must believe there is a perceived threat of disease and experience cues to action such as media influence, reminders for check-ups, or seeing a family member go through an illness. The likelihood of action is influenced by the individual's perceived benefits and barriers and perceived self-efficacy (Rosenstock, 1974).

Another model that is helpful when influencing behaviors is the Spectrum of Prevention. The Spectrum of Prevention includes six levels of promoting health starting with individual knowledge and moving to the most encompassing level of policy and legislation (Prevention Institute, 2017). When merged, the HBM and the Spectrum of Prevention tool can be used synergistically to further improve patient health outcomes by moving beyond patient education to include the social context of the patient. For example, the Spectrum of Prevention and HBM can be used to influence the perceptions, attitudes, and behaviors of healthcare professionals related to incorporating lifestyle counseling in primary care. Figure 3 (found on page 6) is an image of what a combination of the HBM and Spectrum of Prevention would look like. As indicated in Figure 3, education for both individuals and healthcare providers is important to influence perceptions and increase the confidence of providers' ability to engage in health behavior counseling and the patients' ability to change health behaviors. In addition, cues to action are needed in order to change providers' behaviors such as changing Electronic Medical Record (EMR) systems and changing health insurance coverage policies.

Within the healthcare sector, technical fixes (e.g. pharmaceuticals, procedures, surgery) are currently the dominant approaches used by providers, but with the high rates of preventable chronic disease and rising health care costs, the U.S. can no longer rely on technical approaches alone. Helping patients make lifestyle changes requires adaptive approaches by health care professionals (Thygeson et al., 2010). These adaptive approaches are qualitatively different from the technical approaches often used in healthcare. A challenge, though, is using lifestyle interventions within medical care to prevent and treat cardiovascular disease, cancer, stroke, and diabetes because it is not fully embraced by all healthcare professionals or integrated within the health systems. Moreover, minimal options are available for treating some lifestyle health

conditions such as obesity in clinical practice, and therefore, have not been prioritized by primary care providers (Schroeder, 2007). More recent recommendations for prevention and treatment of chronic disease proposes public health and healthcare systems work together by utilizing strategies addressing multiple risk factors (Bauer et al., 2014; Cohen et al., 2005; National Prevention Council, 2011; Steele et al., 2017).

Health System Approach

Despite the U.S. spending an estimated $2.1 trillion in 2006, the high cost and impressive advances in medical technology are not improving the health of people in the U.S. (Schroeder, 2007). Even with higher expenditures, the increasing prevalence of chronic diseases continues to put the U.S. life expectancy in jeopardy; in fact, this generation of youth could be the first generation to not outlive their parents (Olshanksy et al., 2005). The increased prevalence of chronic disease is contributing to people in the U.S. living shorter and less healthy lives (Avendano & Kawachi, 2014). Healthcare resources in the U.S. are systematically allocated in ways that do not allow for maximized health or cost control (Cantor, Mikkelsen, Simons, & Waters, 2013).

Using exercise as a vital sign (EVS) has the potential to provide information on the relationships among exercise and healthcare use, cost, and chronic disease that has not been previously available at the population level (Coleman et al., 2012). Findings from the Aerobics Center Longitudinal Study have been used over the past two decades to identify predictors of mortality, including physical activity, smoking, and diagnosis of chronic disease. One particularly significant finding is that cardiorespiratory fitness (CRF) was found to be an independent predictor of all-cause mortality (Wei et al., 1999). In fact, low CRF predicted more excess deaths from all causes than blood pressure and tobacco use. While the current healthcare

system gathers weight and blood pressure measurements, and assesses for tobacco use at each visit, it does not capture a fitness measurement. EVS could be used as a proxy for fitness assessment, which could have substantial impact on chronic disease prevention and management knowing that fitness, independent of fatness, blood pressure, and tobacco use, predicts risk of death.

Using self-report measures that are tested, such as EVS, offer a more realistic and systematic approach to integrating lifestyle assessment into primary care. Overall, capturing health behavior data was found to be feasible in the clinical setting and an avenue to address behavior change (Fernald et al., 2008). While there are current United States Preventive Services Task Force (USPSTF) recommendations for obesity screenings and referrals to behavioral interventions for patients who are overweight and have other cardiovascular disease risk factors, it is up to the provider and insurance carrier to define medical necessity (U.S. Preventive Services Task Force, 2017). By using a built-in system (such as EMR), provider engagement can be improved for discussing health concerns with patients as well as to help providers better manage their patient load and long-term patient health (Bardach & Schoenberg, 2012; Krist et al., 2008). By having a system that prompts for lifestyle discussion points, such as PA level, and allows for logging of patient-provider discussions there is increased opportunity for prevention and lifestyle treatment in primary care.

Lifestyle Change as Chronic Disease Treatment

When studying lifestyle interventions in comparison to standard medical treatment, results have been positive for lifestyle to improve disease prognosis for several conditions including major depressive disorder, type II diabetes, and cancer (Diabetes Prevention Program Research Group, 2002; Dunn, Trivedi, Kampert, Clark, & Chambliss, 2005). In addition,

lifestyle factors such as physical inactivity, have been associated with reduced QOL among many different health conditions (Bize, Johnson, & Plotnikoff, 2007; Blanchard, Courneya, & Stein, 2008; Eriksson et al., 2010).

The health of the U.S. population is influenced by behavioral factors and a healthcare system designed to treat the symptoms resulting from engaging in poor lifestyle behaviors, rather than preventing disease. A more preventive approach needs to be taken in the U.S. with healthcare and public health systems (Mokdad et al., 2004). In order to move to a more preventive approach, providers must be supported to adopt primary prevention approaches with patients. Taking a preventive approach in health systems should continue to be introduced and assessed; more specifically, using the Lifestyle Medicine (LM) approach (Egger et al., 2009). Lifestyle Medicine is not new, and it is not an alternative form of medicine, but it does require the healthcare professional to approach the practice of medicine differently. The provider must possess a more detailed understanding of the patient's underlying health habits and health risks (Dysinger, 2013).

Lifestyle Medicine is a clinical approach using therapeutic interventions of diet, exercise, and stress management to address health challenges primarily focused on chronic conditions (Egger, Binns, & Rossner, 2009). Health system approaches such as using EMR to prompt discussion and prescribe exercise, along with community partnerships such as with a local fitness center, need to be further developed and utilized. Clinical and community partnerships and interventions like this are examples of a practical LM approach. Support has been shown for treating patients using lifestyle approaches in a clinical setting for smoking, nutrition, physical activity, screening for diseases, and counseling (Fernald et al., 2008; Green et al., 2008; Segal et al., 2016).

Moving from sick care to preventive care and early intervention using LM approaches must be further explored and studied for both improved health outcomes and financial sustainability. The healthcare system must change its focus from immediate cost containment to long-term investment for long-term health outcomes (Bardach & Schoenberg, 2012). Conducting additional research in support of a positive association between PA and health-related QOL could provide motivation for patients and healthcare providers to use exercise as medicine (Bize et al., 2007). Consideration of chronic disease risk and QOL measures, while simultaneously improving lifestyle behaviors such as physical activity, warrants further exploration in order to develop evidence-based practices within healthcare systems. This research is significant because the health of the U.S. population is failing despite the best healthcare technology in the world; more needs to be done to improve health status and reduce the burden of chronic disease. Therefore, the purpose of this study was to explore potential differences in QOL and PA level of patients who either engaged or did not engage in LM.

Methods

Participants included primary care patients at a regional healthcare system who were referred to the LM program. The LM program included provider referrals to the health system exercise as medicine program which included prescriptive and guided personal training. A dietetic technician and dietitians were available within the health system, but not included as a formal part of the LM referral during the timeframe included in this study. To be included, participants had to be between the ages of 18-89. Total number of eligible participants was 213. Institutional Review Board approval was obtained for this study.

Data Collection

In order to meet the purpose of this study, data were collected to identify potential differences in QOL and PA level of patients who engaged in LM in one of three categories, 1) did not engage in LM 2) engaged in up to two sessions of LM 3) engaged in three or more sessions of LM. These categories were created because patients were given the first two sessions of LM free of charge. Patients who were referred to LM between October 1, 2016 and September 30, 2017 were contacted and asked to participate. Patients were mailed an informed consent, which served as the invitation to participate in the study, along with a coded demographics question set, QOL questionnaire, and PA questions to ensure anonymity of responses but also allow for returned questionnaires to be tracked. Questionnaires were mailed in the health system envelope from the health system as a strategy to potentially increase participation. In addition, participants were given a free LM visit from the healthcare system which was offered through the informed consent document. Initially, questionnaires were mailed March 1, 2018 and a second wave was mailed to those who had not yet responded March 28, 2018. Participants who responded and returned the survey by April 16, 2018 were included in the study.

Specific tools used included the RAND-36 item health questionnaire (SF-36) to assess QOL and Physical Activity Vital Sign (PAVS) questions. The SF-36 is a previously validated and highly utilized QOL tool (R.D. Hays et al., 1998; Ron D Hays & Morales, 2001). The SF-36 questionnaire consists of 36 questions with eight health concepts: physical functioning, role limitations caused by physical health problems, role limitations caused by emotional programs, social functioning, emotional well-being, energy/fatigue, pain, and general health perception. The two questions of the PAVS measure were used to assess patient physical activity level. This

tool was developed for the Exercise is Medicine ® program and is a tool in the healthcare providers action guide (American College of Sports Medicine, 2018).

Data Analysis

Data were analyzed using SPSS version 24. Alpha levels for all tests of significance were set at $p \leq 0.05$. Patients were grouped by volume of LM visits as follows so that QOL response and PA behavior could be compared among groups, 1) did not engage in LM 2) engaged in up to two sessions of LM 3) engaged in three or more sessions of LM. Quality of life scores were also calculated for each category using the RAND scoring form and PA was stratified into 'met' or 'not met' current guidelines which are 150 minutes per week.

Correlations among QOL scales, PA minutes, and number of LM visits were determined using Pearson correlation. Shapiro-Wilk tests for normality were run to assess distributions of data. To test for any potential mean differences between LM visit groups, one-way ANOVA was performed with number of LM visits as the independent variable and PA minutes as the dependent variable. This test was repeated with general QOL score as the dependent variable. For all other variables, the non-parametric test Kruskal-Wallis was used to compare the distribution of dependent variables among the different LM visit groups.

Chi-square tests of association were used to test for the association between LM visits and meeting PA guidelines as well as used to analyze any potential effect of education level on meeting PA guidelines. An independent samples t-test was run to test for a significant difference of general health QOL between patients who met or did not meet PA guidelines. Forward selection was used to determine the best linear regression model for predicting general health QOL.

Results

The total number of participant respondents was N = 53 which is a response rate of 25% (53/213). Participants were white and female (64.2%), 54.7% were educated at the Associate degree level or above, over 70% were married, and income level was varied across categories. Full participant demographics are displayed in Table 1.

Table 1

Patient Demographics

Variable	Percent (*n*)
Gender	
Female	64.2*(34)*
Male	35.8 *(19)*
Ethnicity	
White	98.1 *(52)*
No response	1.9*(1)*
Highest Degree/School completed	
Some school, no diploma	-
High school graduate, diploma	17 *(9)*
Some college credit, no degree	26.4 *(14)*
Associate degree	15.1 *(8)*
Bachelor's degree	26.4 *(14)*
Master's degree	11.3 *(6)*
Professional degree	-
Doctorate degree	1.9 *(1)*

Table 1. *Patient Demographics* (continued)

Variable	Percent (*n*)
Marital Status	
Single, never married	3.8 *(2)*
Married or domestic partnership	71.7 *(38)*
Widowed	17 *(9)*
Divorced	3.8 *(2)*
Separated	-
Household income over 12 months	
Less than $25,0000	13.2 *(7)*
$25,000 to $34,999	13.2 *(7)*
$35,000 to $49,999	11.3 *(6)*
$50,000 to $74,999	18.9 *(10)*
$75,000 to $99,999	7.5 *(4)*
$100,000 or above	20.8 *(11)*
Prefer not to answer	11.3 *(6)*
Age	
Range in years	29 – 89
Mean (SD)	64.91 (11.899)

Participants were grouped by LM visits and the number of respondents in each group were (1) n = 25 (2) n = 14 (3) n = 14. Pearson correlation results revealed that the general health QOL scale was significantly correlated with all other QOL scales. One weak but significant correlation was found with PA minutes and this variable was correlated with general health (r = .300, $p < .05$). Strong, positive correlations of higher than .7 were found between the following

QOL scales: role limitations due to physical health problems and social functioning (r = .712, p < .01); role limitations due to physical health problems and general health (r = .707, p < .01); energy/fatigue and emotional well-being (r = .732, p < .01). Number of LM visits was negatively, significantly correlated with six QOL scales: role limitations due to physical health problems, role limitations due to emotional health problems, emotional well-being, energy/fatigue, pain, and general health. All correlation values can be found in Table 2.

Table 2

Pearson Correlations among Quality of Life scales, Physical Activity minutes, and Number of LM visits

	1	2	3	4	5	6	7	8	9	10
1. Number of LM visits	.									
2. PA minutes	-0.100	.								
3. Physical function	-0.128	0.174	.							
4. Role limitations due to physical health problems	-0.330*	0.201	0.678**	.						
5. Role limitations due to emotional problems	-0.350*	0.231	0.235	0.342*	.					
6. Energy/fatigue	-0.307*	0.083	0.470**	0.490**	0.517**	.				
7. Emotional well-being	-0.390**	-0.046	0.371**	0.341*	0.412**	0.732**	.			
8. Social functioning	-0.249	0.190	0.606**	0.712**	0.464**	0.527**	0.538**	.		
9. Pain	-0.406**	0.040	0.623**	0.634**	0.282*	0.684**	0.548**	0.563**	.	
10. General health	-0.320*	0.300*	0.603**	0.707**	0.516**	0.693**	0.524**	0.657**	0.612**	.

** Correlation is significant at the 0.01 level (2-tailed)

* Correlation is significant at the 0.05 level (2-tailed)

The Shapiro-Wilk test for normality was run by LM group. For the zero visit group, the following QOL scales were approximately normally distributed: energy, emotional well-being, pain, and general health. For the LM group with 1-2 visits, the QOL scales of energy, emotional well-being, and general health had approximate normal distributions. The highest number of scales with approximate normal distributions was found with the 3 or more LM visit group and included PA minutes, physical functioning, energy, emotional well-being, pain, and general health.

One-way ANOVA was run to look at associations between LM visits groups (0 visits, 1-2 visits, and 3 or more visits) and the QOL scales for energy, emotional well-being, and general health. No significant effects were found, but the energy scale was close to significant [$F(2,48) = 2.710$, $p = .077$]. Full results are presented in Tables 3, 4 and 5. The Kruskal-Wallis test was run for the remaining variables that were not normally distributed. No significant results were found between any variable and LM visit group: PA minutes, $p = .392$; physical functioning, $p = .670$; role limitations due to physical health, $p = .144$; role limitations due to emotional health, $p = .108$; social functioning, $p = .591$; pain, $p = .117$.

Table 3

One-way ANOVA for Energy by LM visit groups

Predictor	Sum of Squares	*df*	Mean Square	*F*	*p*
Energy between	2294.635	2	1147.317	2.710	.077
Energy within	20323.993	48	423.417		
Total	22618.627	50			

Table 4

One-way ANOVA for Emotional Well-Being by LM visit groups

Predictor	Sum of Squares	df	Mean Square	F	p
Emotional well-being between	435.670	2	217.835	0.928	.403
Emotional well-being within	11034.410	47	234.775		
Total	11470.080	49			

Table 5

One-way ANOVA for General Health by LM visit groups

Predictor	Sum of Squares	df	Mean Square	F	p
General health between	995.048	2	497.524	1.241	.298
General health within	19645.915	49	400.937		
Total	20640.962	51			

Chi-square tests of association were used to test for associations between meeting PA guidelines based on number of LM visits as well as whether or not a college degree was achieved. There was no significant relationship found between LM visits and meeting PA guidelines ($X^2(1) = 0.183$, p = .669). There was no significant relationship found between earning a college degree and meeting PA guidelines either ($X^2(2) = 0.427$, p = .808). There was a significant difference in mean patient general health QOL score for those who met PA guidelines

(M = 68.16, SD = 23.346) versus those who did not meet PA guidelines (M = 54.67, SD = 16.23); t (48) = 2.41, p = .02. Levene's test showed no significant deviations from equality of variances in general health QOL score between the two groups.

Forward selection was used to build a model to best predict general health QOL. An adjusted R^2 = .682 was found with four independent variables including social functioning, energy, role limitations due to physical health, and PA minutes that contribute to explaining the variability of general health QOL. Tests of multicollinearity indicated a low level of multicollinearity was present. Full statistics can be found in Table 6.

Table 6

Forward multiple linear regression model for general health quality of life

Independent variable	B	SE	*B*	*t*	*p*	VIF
Intercept	17.259	5.954		2.899	.006	
Social Functioning	.210	.107	.256	1.957	.057	2.057
Energy	.322	.094	.360	3.440	.001	1.443
Role limitations due to physical health	.145	.057	.307	2.516	.016	1.964
PA minutes	.024	.010	.207	2.377	.022	1.069

Overall, 35.8% of the patients who responded met the physical activity guidelines of 150 minutes of PA each week. The zero visit LM group had the highest rate of meeting the PA guidelines at 41.7%. The 1-2 visit group had a rate of 28.6% and the 3 or more visit group had a rate of 38.5% of respondents who met PA guidelines.

Discussion

The purpose of this study was to explore potential differences in QOL and PA level of patients who either engaged or did not engage in LM. Because previous research has found QOL to be positively influenced by PA level (Bize et al., 2007; Vuillemin et al., 2005), a secondary interest developed to explore other factors that influence general health QOL.

When analyzing for any differences among LM groups with QOL and PA, no significant differences were found. Considering the PA level reported by each LM group, this result is not surprising because the zero visit LM group had the highest PA level. This result does pose some additional questions, however, in how previous and current health status may influence the relationships among LM engagement, PA level, and QOL.

The negative correlations found between the number of LM visits and QOL scales implies that the more LM visits a patient attended, the lower the score of the QOL scale. This is an interesting outcome because it could be hypothesized that more LM visits would lead to higher QOL outcomes. In this study, it appears that patients who did not engage in LM visits (those in the zero visits category) had the highest PA behavior of the three groups. The negative correlations provide some additional information that may imply patients with more health conditions are attending LM visits and so have a lower PA behavior and subsequently a lower QOL outcome than potentially healthier patients choosing not to attend the LM program. Previous research has found that patients with greater chronic disease burden are more likely to receive lifestyle behavior advise, specifically physical activity and diet-related, from providers (Sinclair, Burge, & Lawson, 2008). Further research is needed to study these possibilities.

Many strong, significant correlations were found among QOL scales. This shows that there are multiple aspects that contribute to defining QOL. This is also supported by 68% of the

variability with general health QOL found to be explained by the factors of PA minutes, social functioning, energy, and role limitations due to physical health. A high percentage of positive general health is contributed to by engaging in PA, having energy or pep and not feeling worn out, being able to engage in social functions with family and friends, and reported functional limitations due to physical health. The role limitations result appears somewhat out-of-place but the questions in this scale are related to ability to perform regular physical activities over the past four weeks and are heavily influenced by acute physical issues (e.g. sprained ankle) which may not be representative of 'typical' physical limitations. Also, this result reveals that a physical limitation may not lead to reduced QOL.

The significant correlation between PA minutes and general health is supportive of previous literature showing the relationship between PA behavior and QOL (Bize et al., 2007; Blanchard et al., 2008; Vuillemin et al., 2005). The significant difference found in general health QOL with patients who met PA guidelines versus those who did not is similar to what previous research has found and that there appears to be a dose-response relationship between QOL and PA (Vuillemin et al., 2005). This result adds support to the gap in literature that currently exists to help drive/motivate healthcare providers to use exercise as medicine or LM in the clinical setting (Bize et al., 2007).

Overall PA behavior was low with 35.8% of respondents meeting the recommended PA guidelines. This is lower than the current national report for adults who meet PA guidelines of 150 minutes of moderate activity per week (Centers for Disease Control and Prevention, 2015). This study has found that increased PA behavior positively influences QOL in-spite of the fact that PA behavior of patients in this study is below the current U.S. rate. We know that physician visits have become focused on the population age 45 and older with chronic conditions (Cherry

et al., 2010). While specific chronic conditions of patients in this study were not reported, the mean age was 65 years which aligns with previous literature on the demographics of patients being seen the most in the clinic.

Strengths of this study include specificity and validity in the tools used to assess QOL and PA level. Using the SF-36 facilitates comparison of results with similar studies and adds support for using QOL as a health outcome measure. Another strength of this study is using an in-tact LM program to analyze and apply results from real-world situations.

Limitations

There are also study limitations that need to be addressed. Limitations include self-report bias due to data being gathered by mailed questionnaires; selection bias since only patients referred to the LM program had access to participate; potential for nonresponse error and that the small sample size may have influenced the ability to find additional significant results; and generalizability to other health systems because this study used a Midwest health system with an in-place LM program. Previous studies have shown that anonymity of respondents were associated with a reduced response rate and this current study required anonymity due to personal health information (Asch, Jedrziewski, & Christakis, 1997). While response rate was low, there is not necessarily a relationship between response rate and bias (Asch et al., 1997; Dillman, 1991).

Conclusion and Future Research Directions

This study has added support to the evidence that PA behavior has a strong influence on the factors of QOL. With a better understanding of how PA behavior influences QOL, primary care settings can be better structured and providers can be better s trained to counsel their patients using a LM approach. Using primary care as a place-based approach to influence PA and

long-term patient health has been found to be successful in previous studies (Bardach & Schoenberg, 2012; Krist et al., 2008). In addition, using LM and specifically PA to prevent and treat chronic disease, has been found to be successfully implemented within the healthcare system (Heath, Kolade, & Haynes, 2015).

More effective use of the primary care setting is to implement standardized interventions throughout the healthcare system as well as higher-level strategies (beyond education). These strategies can include prescriptions and referrals to PA programs or LM (2018 Physical Activity Guidelines Advisory Committee, 2018). Using the healthcare system to counsel patients' lifestyle behaviors has the potential for primary, as well as secondary, prevention or stopping/reversing initial symptoms of chronic disease.

Future research should include comparing LM visits with specific chronic disease outcomes and QOL to better inform how LM can be used to improve chronic disease treatment and prevention. Using a pre and post study design is also recommended to better inform and evaluate LM programs and healthcare system structure as well.

STUDY 2

Introduction

Quality of life (QOL) is a measure that is used to assess overall health and happiness. Among the countries of the Organization for Economic Cooperation and Development (OECD), life satisfaction is used as a measure of overall QOL across countries. The U.S. has a slightly higher than average score on general life satisfaction among OECD countries, interestingly though, the U.S. scores lower than the average on social connectedness and work-life balance which are factors that can influence overall QOL (Organization for Economic Cooperation and Development, 2015). Previous literature has found associations between physical activity (PA) and QOL using the health-related QOL tool the SF-36 (Bize et al., 2007; Vuillemin et al., 2005).

Nearly half (46.9%) of adults in the United States (U.S.) do not meet the minimum recommended amount of physical activity for general health benefits which is 150 minutes of moderate activity per week (National Center for Health Statistics, 2015a)). In 2008, the Physical Activity Guidelines for Americans were developed recommending amounts of aerobic and strength activities for general health (U.S. Department of Health and Human Services, 2008). Even with these guidelines, data continues to reveal that American adults are deficient in their physical activity behavior.

Ironically, the U.S. spends more on health care per capita than any other OECD nation, but at the same time, the U.S. experiences lower ratings for factors that influence overall happiness and QOL. The U.S. spends 16.9% of the Gross Domestic Product (GDP) compared to the OECD average of 9% GDP (Organization for Economic Cooperation and Development, 2015). Despite higher expenditures, the increased prevalence of chronic diseases puts U.S. life

expectancy in jeopardy with predictions of trends toward a reduction in life expectancy, as well as increased years of morbidity (Olshanksy et al., 2005).

One explanation for the disconnect between dollars invested and health outcomes is that the healthcare system is designed to treat acute and emergent conditions, which does not allow for time and focus to be spent on conditions that require substantial behavior change. Within the healthcare sector, technical fixes (e.g. pharmaceuticals, procedures, surgery) are the dominant approach to-date but with the high rates of preventable chronic disease and rising health care costs, the U.S. can no longer rely on technical approaches alone. Helping patients make lifestyle changes requires adaptive approaches (e.g. exercise prescription, counseling) by health care professionals (Thygeson et al., 2010). Using an adaptive approach including lifestyle interventions within medical care is not fully embraced by all healthcare professionals or integrated within the health systems. In addition, options for treating lifestyle health conditions such as obesity in clinical practice are scarce, and therefore, have not been prioritized (Schroeder, 2007).

However, it is promising that patients want to have preventive health discussions with their healthcare providers (Wolff et al., 2010). Embracing patient-centered, adaptive approaches to lifestyle health problems would help provider-patient communication, but providers may not be comfortable using these approaches due to lack of training. Nevertheless, it is important for the provider to take ownership in having preventive health conversations and using evidence-based practices for mobilizing patient behavior change (Sinclair et al., 2008; Thygeson et al., 2010). Physician attitudes toward behavioral counseling in primary care are mostly favorable, but the healthcare system in which they practice, at best, constrains, and at worst, prohibits spending time helping patients change health behaviors (Bardach & Schoenberg, 2012).

One emerging evidence-based health system approach is using exercise as a vital sign (EVS) to provide a measurement of health behavior that could be used to prevent disease development. In fact, it is suggested that using patient self-reported health status could improve the conversation between the patient and health professional (Meurer et al., 2001). Discrepancies in patients' perceptions of their health and actual health status could increase motivation of the healthcare provider to engage in a lifestyle conversation. Due to the value of self-reported health status and health, some recommend including it as a vital sign (Meurer et al., 2001; Patrick, Pratt, & Sallis, 2009). Therefore, using EVS is an important tool for health promotion within the healthcare setting (Coleman et al., 2012; National Physical Activity Plan Alliance, 2016; S. M. Smith et al., 2012).

The National Prevention Council's (2011) recommendation is that all people should receive appropriate preventive care in clinical settings which are also supported by community resources and environments where people live out their daily life. Healthcare system interventions developed to target a specific risk factor were most likely to be effective; whereas interventions not linked with a healthcare system were less likely to be found effective (Smith et al., 2012). By using the healthcare system as a place-based approach, community resources are capitalized, community health needs assessments are better utilized, and new healthcare models such as accountable health or accountable care organizations (ACO) and medical homes are utilized to create greater health impact (Segal et al., 2016). One effective way to use the healthcare system as a place to improve lifestyle behaviors is Lifestyle Medicine (LM). Lifestyle Medicine is a therapeutic intervention approach used to address health challenges primarily around chronic conditions in a clinical setting (Egger et al., 2009).

One healthcare system in the upper Midwest has implemented a LM program into their primary care services (Schulz & Erickson, 2016). Their program focuses on taking a preventive approach to decrease disease risk through behaviors of healthy eating, physical activity, and reducing stress. This health system is working on reducing healthcare costs as well by moving to a value-based care model (Schulz & Erickson, 2016). Value-based care is based on three overarching goals; better individual care, better population health; and lower costs (Centers for Medicare and Medicaid Services, 2017). This approach uses financial incentives for healthcare providers based on the quality of patient care.

Ultimately, physicians need to become champions for population health (Schroeder, 2007). Currently, healthcare professionals do not provide preventive care in a manner consistent with clinical guidelines in spite of strong patient support for preventive care (McElwaine et al., 2013). Health care professionals practicing LM must strive to engage in healthy lifestyles themselves to serve as a model and be engaged in the community to change the culture and environment around lifestyle factors such as food, fitness, sleep, and social support (Bauer et al., 2014; Dysinger, 2013; National Physical Activity Plan Alliance, 2016).

Physician behavior and perceptions influence how, or even if, the physician engages in PA counseling with patients (Behrens & Harbour, 2014; Vickers, Kircher, Smith, Petersen, & Rasmussen, 2007). More specifically, provider PA level has been shown to influence provider choice to engage in behavioral counseling with patients. Successful behavioral counseling has also been found to be influenced by providers sharing personal health behaviors with their patients (e.g. riding a bike to work; purchasing vegetables from community garden/market) (Frank, Breyan, & Elon, 2000). In order for providers to be able to share personal examples with their patients, they need to be practicing and actively working toward these behaviors. Aspects of

the healthcare environment warrant further study for specific influences of individual provider health behavior, provider-patient communication, and peer provider influence (Behrens & Harbour, 2014; Honda, 2004; A. W. Smith et al., 2011; Thygeson et al., 2010; Vickers et al., 2007). Therefore, the purpose of this study was to explore the relationship among provider QOL, provider PA level, and referral practices to LM.

Methods

Providers from a Midwest healthcare system were invited to participate in the study through an in-person request at a healthcare system provider meeting in February 2018. These providers all had the ability to refer to the health system LM program which, during the timeframe of the study, included personal training and goal setting developed by the health system exercise specialists. At this meeting, providers were given an informed consent, demographics questionnaire, QOL questionnaire, and PA questionnaire. All responses were collected the day of the meeting. Participants included providers who had access to the LM program as part of the health system. Institutional Review Board approval was obtained for this study.

Data Collection

The purpose of the study was to explore potential relationships among provider QOL, physical activity level, and referral practices to the healthcare system's LM program. In order to assess these areas of interest, the RAND-36 item health questionnaire (SF-36) and Physical Activity Vital Sign (PAVS) measures were used. Quality of life was measured using the previously validated and highly utilized SF-36 tool (R.D. Hays et al., 1998; Ron D Hays & Morales, 2001). The SF-36 questionnaire consists of 36 questions within eight health concepts: physical functioning, role limitations caused by physical health problems, role limitations caused

by emotional programs, social functioning, emotional well-being, energy/fatigue, pain, and general health perception. The two questions of the PAVS measure were used to assess provider physical activity level. This tool was developed for the Exercise is Medicine ® program and is a tool in the healthcare providers action guide (American College of Sports Medicine, 2018). Data was collected the day of the provider meeting and responses analyzed for self-reported provider demographics, QOL, and PAVS.

Data Analysis

Data were analyzed using SPSS version 24. Alpha levels for all tests of significance were set at $p \leq 0.05$. Quality of life scores were calculated for each category using the RAND scoring form and PA was stratified into 'met' or 'not met' current guidelines which are 150 minutes per week. Pearson correlations were calculated to evaluate the relationships between QOL concepts, minutes of weekly physical activity, and select strategies used to address patient lifestyle. In addition, an independent samples t-test was used to test for a significant difference between providers who met physical activity guidelines and their general health QOL score. An independent samples t-test was also used to detect significant differences between providers who referred to LM and those who did not in 1) their PA minutes and 2) general health QOL.

Results

Participants (N=11) were mostly white (n=10; 90.9%) and fairly evenly distributed between gender (6 female and 5 male). Full participant demographics are displayed in Table 7.

Table 7

Provider Demographics

Variable	Percent (*n*)
Gender	
Female	54.5 *(6)*
Male	45.5 *(5)*
Ethnicity	
White	90.9 *(10)*
Asian/Pacific Islander	9.1 *(1)*
Area of medical training	
Internal Medicine MD	54.5 *(6)*
Family Medicine MD	9.1 *(1)*
Physician Assistant	9.1 *(1)*
Nurse Practitioner	9.1 *(1)*
Other	18.2 *(2)*
Area of primary practice	
Out-patient	63.6 *(7)*
In-patient	9.1 *(1)*
Equal time out and in-patient	27.3 *(3)*
Years in medical practice	
Less than 5	45.5 *(5)*
5-10	18.2 *(2)*
More than 10	36.3 *(4)*

There was one positive, perfect correlation found between physical functioning and role limitations due to emotional problems (r =1.00, p =0.00) among providers. Another notable result is the significant correlations found between general health and five of the other QOL concepts; physical functioning (r = 0.733, $p < 0.05$), role limitations due to emotional problems (r = 0.735, $p < 0.05$), emotional well-being (r = 0.701, $p < 0.05$), energy/fatigue (r = 0.723, $p < 0.05$), and pain (r = 0.734, $p < 0.05$). All correlations can be found in Table 8.

Sample size were small, making it difficult to obtain significant correlations using provider PA and strategies providers use to address patient lifestyle. Three strong correlations were reported with providers who advise their patients to engage in PA and the following; provider emotional well-being (r = .684, p = .09), provider energy (r = .688, p = .07), and referral to LM (r = .655, p = .078).

Table 8

Pearson Correlations among Provider QOL, PA, and referral

	1	2	3	4	5	6	7	8	9	10	11
1. Physical functioning	.										
2. Role limitations due to physical health problems	.516	.									
3. Role limitations due to emotional problems	1.00 **	.516	.								
4. Social functioning	.924**	.313	.924**	.							
5. Emotional well-being	.60	.193	.600	.600	.						
6. Energy/fatigue	.735**	.354	.735**	.565	.891**	.					
7. Pain	.592	.415	.592	.357	.723*	.819**	.				
8. General health	.733*	.419	.735*	.587	.701*	.723*	0.734*	.			
9. PA minutes	.447	.199	.447	.377	.085	.209	-.047	.439	.		
10. Refer to LM	.149	-.218	.149	.000	.548	.502	.145	.113	.321	.	
11. Advise PA	.488	-.143	.488	.267	.684	.668	.615	.593	.421	.655	.

** Correlation is significant at the 0.01 level (2-tailed)

* Correlation is significant at the 0.05 level (2-tailed)

There was a significant difference in mean provider general health QOL score for those who met PA guidelines (M = 85.833, SD = 10.68) versus those who did not meet PA guidelines (M = 67, SD = 9.08); t (9) = 3.109, p = .013. Levene's test showed no significant differences in variances among the two groups. The percentage of providers who met the PA guidelines of 150 minutes per week was 54.5 % (6/11). No significant difference was found for provider PA minutes for those who referred to LM (M = 262.5, SD = 231.55) versus those who did not refer to LM (M = 112.5, SD = 159.1); t (6) = -.831, p = .749. No significant difference was found for provider general health for those who referred to LM (75.83, SD = 11.583) versus those who did not refer to LM (M = 72.5, SD = 24.749); t (6) = -.279, p = .438. Levene's test showed no significant differences in variances among the two groups.

Discussion

The purpose of this study was to explore potential relationships among provider QOL, physical activity level, and referral practices to a healthcare system's LM program. Many significant correlations were found among provider QOL concepts which provides support for the SF-36 tool as an effective tool for assessing QOL among healthcare providers. Though not statistically significant, strong Pearson correlations were found between providers who advise their patients to be physically active and provider scores for emotional well-being, energy, and referral behavior to LM. These correlations may begin to suggest a relationship between provider emotional health and energy level and likelihood to engage in lifestyle behavior counseling through advising patients to be physically active and/or participate in a LM program.

Provider PA level was slightly higher than the current U.S. rate of adults meeting aerobic activity guidelines (National Center for Health Statistics, 2015a). This result along with the

significant difference found in general health QOL score for providers who met PA guidelines is supported by previous research that has found PA behavior related to QOL (Bize et al., 2007; Vuillemin et al., 2005). While there were no significant differences found with provider PA minutes and general health based on LM referral practice, it is worth noting that mean scores for PA minutes were 150 minutes greater per week in the referral category. Providers who reported referring to LM have a mean PA level drastically higher than the current recommendations for health.

This study has improved the understanding and provided some preliminary insight into provider PA behavior and its relationship with QOL and referral practice to LM. Similar to previous results, this study enhances support for provider health behavior influencing patient behavioral counseling around lifestyle (Behrens & Harbour, 2014; Vickers et al., 2007). In a recent data analysis of physical activity counseling with arthritic patients, a slight increase in provider physical activity counseling was seen from 2002 to 2014 (up to 61%) (Hootman et al., 2018). Though challenging, it is important for providers to understand their counseling practices and engage in lifestyle behavior-change discussion with all of their patients to provide primary prevention practices in primary care settings (Sinclair et al., 2008). National trends are showing that providers are increasing their counseling with patients to encourage more PA behavior (Barnes & Schoenborn, 2012). However, there is still room for improvement, especially with groups of patients who are inactive and would benefit even more by targeting physical activity counseling in primary care.

Previous research has found a high prevalence of physician referrals to technical fixes including pharmacologic and surgical interventions instead of lifestyle interventions (A. W. Smith et al., 2011). Researchers are starting to find that providers are increasing efforts to

encourage their patients to engage in PA and that more support is needed by the healthcare system (Forjuoh et al., 2017; A. W. Smith et al., 2011).

Strengths of this study include specificity and validity in the tools used to assess QOL and PA level. Using the SF-36 allows for results to be compared with results from similar studies and adds support to what is currently known about health behaviors of providers and how they influence medical practice.

Limitations

Although this study has strengths in the application for healthcare providers and healthcare systems, there are limitations that need to be addressed. Limitations include self-report bias due to data being gathered by self-report questionnaires; selection bias since only providers who attended the February meeting had access to participate; the small sample size may have influenced the ability to find additional significant results; and generalizability to other health systems because this study used a Midwest health system with an in-place LM program.

Conclusion and Future Research Directions

This study found that provider PA level at the threshold of current U.S. PA guidelines is related to higher provider scores for general health QOL. Provider PA level, as a measure of health behavior, and QOL are part of the healthcare provider's character and can influence how he or she provides care. Part of what was explored in this current study with utilizing a LM program can be considered as an example of exercise as medicine. By embracing the exercise as medicine philosophy, providers use evidence-based physical activity programs and strategies when treating patients. Using a systematic approach to integrating lifestyle behavior discussions into the clinical setting is suggested to increase patient's healthy behavior (specifically exercise) such as using EVS (Hootman et al., 2018; Patrick et al., 2009).

Future research should include ways to train healthcare professionals in LM. Recent studies have shown that provider continuing medical education (CME) around ways to counsel patients can be a way to increase lifestyle discussions between patients and providers (Dacey, Arnstein, Kennedy, Wolfe, & Phillips, 2013; Hootman et al., 2018). More research is needed on the effectiveness of current provider practices around lifestyle change behavior counseling with their patients (Frank et al., 2000; Kristeller & Hoerr, 1997; S. M. Smith et al., 2012).

SUMMARY

Using lifestyle interventions within primary care to prevent and treat chronic diseases is a strategy that is not fully embraced by all healthcare professionals or integrated within health systems. Technical fixes (e.g. pharmaceuticals, surgery) are the dominant approach currently used in the U.S., but with the high rates of preventable chronic disease and rising healthcare costs, the U.S. can no longer rely on technical approaches alone. The overall aim of this dissertation was to utilize the findings to inform the U.S. healthcare system leaders on the benefits and value of patient and provider QOL related to PA and to promote methods of systematizing the use of LM as treatment for chronic diseases.

The purpose of the first study was to explore potential differences in QOL of patients who were referred to LM and are categorized into one of three groups 1) did not engaged in LM 2) engaged in up to two sessions of LM 3) engaged in three or more sessions of LM. Differences in QOL were stratified by physical activity level. Because provider behavior and beliefs influence how they counsel patients about health, the purpose of the second study was to explore the relationship among provider QOL, physical activity level, and referral practices to LM.

Findings from Study 1

No significant differences were found among LM group with QOL or PA. Considering the PA level reported by each LM group, this result is not surprising because the zero visit LM group had the highest PA level. It appears that patients in the zero visit LM group had the highest PA behavior of the three groups. There are multiple aspects that contribute to defining QOL which was found by the 68% of the variability with general health QOL found to be explained by the factors of PA minutes, social functioning, energy, and role limitations due to physical health. The significant difference found in general health QOL with patients who met

PA guidelines versus those who did not is similar to what previous research has found (Vuillemin et al., 2005).

Findings from Study 2

A significant difference was found with general health QOL for providers who met PA guidelines versus those providers who did not meet the guidelines. Providers with the highest reported minutes of PA were the providers who also referred to the LM program when looking at the reported values. No significant results were found for provider lifestyle behavior counseling strategies with PA or QOL.

Healthcare System Recommendations

Using the primary care setting to influence PA and long-term patient health has been found to be successful in previous studies (Bardach & Schoenberg, 2012; Krist et al., 2008). In addition, using LM and specifically PA to prevent and influence chronic disease, has been found to be successfully implemented within the healthcare system (Heath et al., 2015). Healthcare systems should systematically allow for lifestyle behaviors to be collected, discussed, and used for prevention and intervention. The U.S. National Physical Activity Plan calls for healthcare systems to use PA as a vital sign and to include this in the EMR (Patrick et al., 2009).

Healthcare systems are being called to re-imagine how to use current facilities and resources to support LM. The LM model in this dissertation could be duplicated in other healthcare systems. By having an on-site, clinical physical activity resource for healthcare system providers to refer to is an incredible asset and benefit to the patients. Sharing of EMR between providers and physical activity experts further improves the lifestyle behavior change process and ultimately patient care, patient health, and a reduction in healthcare costs.

Future Research

Future research should include comparing LM visits with specific chronic disease outcomes and QOL to better inform how LM can be used to improve chronic disease treatment and prevention. Using a pre and post study design is also recommended to better inform and evaluate LM programs and healthcare system structure. Better understanding the healthcare team and how all allied health professionals use lifestyle behavior counseling needs to be further studied as well.

Changing the norm of the primary care office visit protocol needs to be explored for more effective ways to counsel patients on lifestyle behaviors. Making group visits built-in to the office-visit structure needs study for effective patient outcomes as well as financial sustainability. And, finally, using insurance codes that are already in place to innovatively fund and deliver patient care around lifestyle change needs to be established and evaluated for effectiveness.

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APPENDIX A. PATIENT INFORMED CONSENT

Dear Lake Region Healthcare Patient:

My name is Stefanie Meyer, a graduate student in a PhD program at North Dakota State University. I am leading a project to explore the differences among patient quality of life, physical activity level, and participation in Lifestyle Medicine. It is my hope that this research will help improve patient satisfaction and health outcomes within the primary care setting.

Because you are a patient within the Lake Region Healthcare system, you are invited to take part in this project. Your participation is entirely your choice, and you may change your mind or quit participating at any time, with no penalty to you. Your personal information has been kept confidential by Lake Region Healthcare.

It is not possible to identify all potential risks in research procedures, but we have taken reasonable safeguards to reduce any known risks. These known risks include: emotional distress. You are not expected to get any benefit from being in this research study. However, benefits to society are likely to include advancement in knowledge, and subsequently, improvement in health care practices.

It should take 10 minutes or less to complete the questions about your background, physical activity, and quality of life. Please complete the questionnaires by honestly answering each question with the instructions provided. As a "thank you", you will receive one **FREE Lifestyle Medicine visit** (Personal Training or Wellness Coaching). Let the staff at the Health and Wellness Hub know you have completed the surveys to redeem your free visit by contacting 218-736-8451.

This study is anonymous. That means that no one, not even members of the research team, will know that the information you give comes from you.

If you have any questions about this project, please contact me at 701-231-6549 or Stefanie.meyer@ndsu.edu, or contact my advisor, Dr. Mary Larson at 701-231-8603 or mary.larson2@ndsu.edu. You have rights as a research participant. If you have questions about your rights or complaints about this research, you may talk to the researcher or contact the NDSU Human Research Protection Program at 701.231.8995, toll-free at 1-855-800-6717, by email at ndsu.irb@ndsu.edu, or by mail at: NDSU HRPP Office, NDSU Dept. 4000, P.O. Box 6050, Fargo, ND 58108-6050.

Thank you for your taking part in this research. If you wish to receive a copy of the results, please contact Stefanie.meyer@ndsu.edu.

APPENDIX B. PATIENT DEMOGRAPHIC QUESTIONS

1. Please specify your ethnicity
_____White
_____Hispanic or Latino
_____Black or African American
_____Native American or American Indian/Alaska Native
_____Asian/Pacific Islander
_____Other

2. What is the highest degree or level of school you have completed? If currently enrolled, please select the highest degree received.
_____Some high school, no diploma
_____High school graduate, diploma or equivalent
_____Some college credit, no degree
_____Associate degree
_____Bachelor's degree
_____Master's degree
_____Professional degree
_____Doctorate degree

3. What is your marital status?
_____Single, never married
_____Married or domestic partnership
_____Widowed
_____Divorced
_____Separated

4. What was your total houseful income before taxes during the past 12 months?
_____Less than $25,000
_____$25,000 to $34,999
_____$35,000 to $49,999
_____$50,000 to $74,999
_____$75,000 to $99,999
_____$100,000 or above
_____Prefer not to answer

APPENDIX C. PROVIDER INFORMED CONSENT

Dear Lake Region Healthcare Provider:

My name is Stefanie Meyer, a graduate student in the PhD program in Exercise Science and Nutrition at North Dakota State University. I am conducting a research project to explore the relationship among provider quality of life, physical activity level, and referral practices to Lifestyle Medicine. It is my hope that this research will help improve patient satisfaction and health outcomes within the primary care setting.

Because you are a provider within the Lake Region Healthcare system, you are invited to take part in this research project. Your participation is entirely your choice, and you may change your mind or quit participating at any time, with no penalty to you.

It is not possible to identify all potential risks in research procedures, but we have taken reasonable safeguards to minimize any known risks. These known risks include: emotional distress. You are not expected to get any benefit from being in this research study. However, benefits to society are likely to include advancement in knowledge, and subsequently, improvement in health care practices.

It should take 10 minutes or less to complete the questions about your background, physical activity, and quality of life. Please complete the questionnaires by honestly answering each question with the instructions provided.

This study is anonymous. That means that no one, not even members of the research team, will know that the information you give comes from you.

If you have any questions about this project, please contact me at 701-231-6549 or Stefanie.meyer@ndsu.edu, or contact my advisor, Dr. Mary Larson at 701-231-8603 or mary.larson2@ndsu.edu.

You have rights as a research participant. If you have questions about your rights or complaints about this research, you may talk to the researcher or contact the NDSU Human Research Protection Program at 701.231.8995, toll-free at 1-855-800-6717, by email at ndsu.irb@ndsu.edu, or by mail at: NDSU HRPP Office, NDSU Dept. 4000, P.O. Box 6050, Fargo, ND 58108-6050.

Thank you for your taking part in this research. If you wish to receive a copy of the results, please contact Stefanie.meyer@ndsu.edu.

APPENDIX D. PROVIDER DEMOGRAPHIC QUESTIONS

Please answer the following the questions by putting an "X" in the appropriate line, writing a response, or circling a number.

1. What is your gender?
_____Female
_____Male
_____Other

2. Please specify your ethnicity
_____White
_____Hispanic or Latino
_____Black or African American
_____Native American or American Indian/Alaska Native
_____Asian/Pacific Islander
_____Other

3. What is your area of medical training?
_____Doctor of Osteopathic Medicine, please list specialization _____
_____Internal Medicine – Medical Doctor
_____Pediatrics – Medical Doctor
_____Family Medicine – Medical Doctor
_____Psychiatrist – Medical Doctor
_____Physician Assistant
_____Nurse Practitioner
_____Other, please list _____

4. Where is your primary practice?
_____in-patient _____out-patient ____equal time spent in-patient and out-patient

5. Please write down the number of years you have been in medical practice _____

6. Please write down the approximate number of patients you see each day_____

7. How do you currently approach lifestyle choices with your patients? Check all that apply.

_____do not discuss
_____discuss in depth during visit
_____handout/written material
_____refer to specialist (e.g. Bariatrics)
_____refer to nutritionist/dietician
_____refer to support group (e.g. Weight Watchers)
_____**refer to Lake Region Lifestyle Medicine (LM) program**
_____advise diet
_____advise patient to "lose some weight"
_____prescribe pharmaceutical medication
_____refer to health club
_____refer to health or wellness coach
_____advise physical activity/exercise

If you refer to the Lake Region LM program, what is **the number of patients** you typically refer:
per day _____ per week _____ per month _____

8. To what degree do each of the following affect your LM ***referral*** practices?

1=does not have an affect 5=greatly affects

a.	Limited time	1	2	3	4	5
b.	Lack of reimbursement and other incentives	1	2	3	4	5
c.	Lack of knowledge of the LM program	1	2	3	4	5
d.	Lack of materials to provide the patient	1	2	3	4	5
e.	Perceived poor patient compliance	1	2	3	4	5

9. How confident are you in Lake Region's LM program to improve your patients' overall health?

1=not at all confident 5=very confident

1 2 3 4 5

APPENDIX E. QUALITY OF LIFE TOOL

RAND HEALTH

RAND > RAND Health > Surveys > RAND Medical Outcomes Study > 36-Item Short Form Survey (SF-36) >

36-Item Short Form Survey Instrument (SF-36)

RAND 36-Item Health Survey 1.0 Questionnaire Items

Choose one option for each questionnaire item.

1. In general, would you say your health is:

- 1 - Excellent
- 2 - Very good
- 3 - Good
- 4 - Fair
- 5 - Poor

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2. **Compared to one year ago**, how would you rate your health in general **now**?

- 1 - Much better now than one year ago
- 2 - Somewhat better now than one year ago
- 3 - About the same
- 4 - Somewhat worse now than one year ago
- 5 - Much worse now than one year ago

The following items are about activities you might do during a typical day. Does **your health now limit you** in these activities? If so, how much?

	Yes, limited a lot	Yes, limited a little	No, not limited at all
3. **Vigorous activities**, such as running, lifting heavy objects, participating in strenuous sports	○ 1	○ 2	○ 3
4. **Moderate activities**, such as moving a table, pushing a vacuum cleaner, bowling, or playing golf	○ 1	○ 2	○ 3
5. Lifting or carrying groceries	○ 1	○ 2	○ 3
6. Climbing **several** flights of stairs	○ 1	○ 2	○ 3
7. Climbing **one** flight of stairs	○ 1	○ 2	○ 3
8. Bending, kneeling, or stooping	○ 1	○ 2	○ 3
9. Walking **more than a mile**	○ 1	○ 2	○ 3
10. Walking **several blocks**	○ 1	○ 2	○ 3
11. Walking **one block**	○ 1	○ 2	○ 3
12. Bathing or dressing yourself	○ 1	○ 2	○ 3

During the **past 4 weeks**, have you had any of the following problems with your work or other regular daily activities **as a result of your physical health**?

	Yes	No
13. Cut down the **amount of time** you spent on work or other activities	○ 1	○ 2
14. **Accomplished less** than you would like	○ 1	○ 2
15. Were limited in the **kind** of work or other activities	○ 1	○ 2
16. Had **difficulty** performing the work or other activities (for example, it took extra effort)	○ 1	○ 2

During the **past 4 weeks**, have you had any of the following problems with your work or other regular daily activities **as a result of any emotional problems** (such as feeling depressed or anxious)?

	Yes	No
17. Cut down the **amount of time** you spent on work or other activities	○ 1	○ 2
18. **Accomplished less** than you would like	○ 1	○ 2
19. Didn't do work or other activities as **carefully** as usual	○ 1	○ 2

20. During the **past 4 weeks**, to what extent has your physical health or emotional problems interfered with your normal social activities with family, friends, neighbors, or groups?

- ○ 1 - Not at all
- ○ 2 - Slightly
- ○ 3 - Moderately
- ○ 4 - Quite a bit
- ○ 5 - Extremely

21. How much **bodily** pain have you had during the **past 4 weeks**?

- 1 - None
- 2 - Very mild
- 3 - Mild
- 4 - Moderate
- 5 - Severe
- 6 - Very severe

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22. During the **past 4 weeks**, how much did **pain** interfere with your normal work (including both work outside the home and housework)?

- 1 - Not at all
- 2 - A little bit
- 3 - Moderately
- 4 - Quite a bit
- 5 - Extremely

These questions are about how you feel and how things have been with you **during the past 4 weeks**. For each question, please give the one answer that comes closest to the way you have been feeling.

How much of the time during the **past 4 weeks**...

	All of the time	Most of the time	A good bit of the time	Some of the time	A little of the time	None of the time
23. Did you feel full of pep?	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6
24. Have you been a very nervous person?	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6
25. Have you felt so down in the dumps that nothing could cheer you up?	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6
26. Have you felt calm and peaceful?	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6
27. Did you have a lot of energy?	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6
28. Have you felt downhearted and blue?	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6
29. Did you feel worn out?	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6
30. Have you been a happy person?	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6
31. Did you feel tired?	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6

32. During the **past 4 weeks**, how much of the time has **your physical health or emotional problems** interfered with your social activities (like visiting with friends, relatives, etc.)?

- ○ 1 - All of the time
- ○ 2 - Most of the time
- ○ 3 - Some of the time
- ○ 4 - A little of the time
- ○ 5 - None of the time

How TRUE or FALSE is **each** of the following statements for you.

	Definitely true	Mostly true	Don't know	Mostly false	Definitely false
33. I seem to get sick a little easier than other people	○ 1	○ 2	○ 3	○ 4	○ 5
34. I am as healthy as anybody I know	○ 1	○ 2	○ 3	○ 4	○ 5
35. I expect my health to get worse	○ 1	○ 2	○ 3	○ 4	○ 5
36. My health is excellent	○ 1	○ 2	○ 3	○ 4	○ 5

APPENDIX F. PHYSICAL ACTIVITY VITAL SIGN MEASURE

Please write in your response to each question.

1. On average, how many days a week do you perform moderate intensity physical activity or exercise, where your heart is beating faster and your breathing is harder than normal (such as a brisk walk)?

_____ days

2. On average, how many total minutes of physical activity or exercise do you perform on those days?

_____ minutes