



January 2017

Healthcare Providers' Perceptions Of Barriers And Facilitators To Making A Recommendation To Screen For Colorectal Cancer

Jesse Tran

[How does access to this work benefit you? Let us know!](#)

Follow this and additional works at: <https://commons.und.edu/theses>

Recommended Citation

Tran, Jesse, "Healthcare Providers' Perceptions Of Barriers And Facilitators To Making A Recommendation To Screen For Colorectal Cancer" (2017). *Theses and Dissertations*. 2152.
<https://commons.und.edu/theses/2152>

This Dissertation is brought to you for free and open access by the Theses, Dissertations, and Senior Projects at UND Scholarly Commons. It has been accepted for inclusion in Theses and Dissertations by an authorized administrator of UND Scholarly Commons. For more information, please contact und.common@library.und.edu.

HEALTHCARE PROVIDERS' PERCEPTIONS OF BARRIERS
AND FACILITATORS TO MAKING A RECOMMENDATION
TO SCREEN FOR COLORECTAL CANCER

By

Jesse L. Tran
Bachelor of Science, Dickinson State University, 2006
Master of Business Administration, University of North Dakota, 2010

A Dissertation

Submitted to the Graduate Faculty

of the

University of North Dakota

in partial fulfillment of the requirements

for the degree of

Doctor of Philosophy

Grand Forks, North Dakota

May
2017

Copyright 2017 Jesse L. Tran

This dissertation, submitted by Jesse L. Tran in partial fulfillment of the requirements of the degree of Doctor of Philosophy from the University of North Dakota, has been read by the Faculty Advisory Committee under whom the has been done and his hereby approved.

Steven LeMire, Chairperson

Joshua Hunter

Katherine Terras

David Tack

Renee Mabey

This dissertation is being submitted by the appointed advisory committee as having met all of the requirements of the School of Graduate Studies at the University of North Dakota and is hereby approved.

Dr. Grant McGimpsey,
Dean of the School of Graduate Studies

Date

PERMISSION

Title Healthcare Providers' Perceptions of Barriers and Facilitators to Making a Recommendation to Screen for Colorectal Cancer

Department Teaching & Learning

Degree Doctor of Philosophy

In presenting this dissertation in partial fulfillment of the requirements for a graduate degree from the University of North Dakota, I agree that the library of this University shall make it freely available for inspection. I further agree that permission for extensive copying for scholarly purposes may be granted by the professor who supervised my dissertation work, or in his absence, by the Chairperson of the department or the dean of the School of Graduate Studies. It is understood that any copying or publication or other use of this dissertation or part thereof for financial gain shall not be allowed without my written permission. It is also understood that due recognition shall be given to me and to the University of North Dakota in any scholarly use which may be made of any material in my dissertation.

Jesse L. Tran
May 13th, 2017

TABLE OF CONTENTS

LIST OF FIGURES	vii
LIST OF TABLES	viii
ACKNOWLEDGEMENTS	ix
ABSTRACT	1
CHAPTER	
I. INTRODUCTION	3
Background Information	4
Statement of the Problem	10
Purpose of the Study	10
Theoretical Framework	11
Research Questions	13
Importance of the Study	13
Summary	14
II. LITERATURE REVIEW	15
Health Education and Health Behavior	15
Colorectal Cancer and Its Impact on North Dakota	17
Colorectal Cancer Screening and Its Problems	18
Theoretical and Conceptual Framework	22
Factors Affecting Screening	32

	Factors Affecting Healthcare Providers' Perceptions.....	37
III.	METHODS	44
	Survey Design.....	44
	Participants.....	44
	Instrument	45
	Procedures.....	48
	Data Analysis	49
	Summary.....	52
IV.	RESULTS	53
	Survey Results	54
V.	DISCUSSION.....	67
	Research Question One.....	67
	Research Question Two	71
	Research Question Three	73
	Research Question Four.....	75
	Implications for Practice.....	77
	Conclusion	81
	APPENDIX.....	83
	REFERENCES	86

LIST OF FIGURES

Figure	Page
1. Structure of the Colon.....	19
2. Health Belief Model Components and Linkages	51

LIST OF TABLES

Table	Page
1. Barriers Limiting CME and the Potential for COP to Address Them	30
2. Demographic Information of Sample	54
3. Descriptive Statistics of Research Questions.....	56
4. Descriptive Statistics Related to Patient, Healthcare Provider, and Systems Barriers.....	58
5. Descriptive Statistics Related to Patient, Healthcare Provider, and Systems Facilitators	60
6. Correlation of Scale Constructs and Measures of Internal Consistency for Barriers	64
7. Correlation of Scale Constructs and Measures of Internal Consistency for Facilitators	64
8. Results of One-Way ANOVA and Measures of Effect Size	65
9. Results of Linear Regression Analysis	66

ACKNOWLEDGEMENTS

I would like to express my sincerest appreciation to my dissertation committee members, Drs. LeMire, Hunter, Mabey, Tack, and Terras. I appreciated all the great feedback and your openness to an unconventional topic. I want to thank Dr. Steven LeMire specifically for his gift of knowledge and guidance which helped me to forge a new career in a new field. I have gained so much from this doctoral experience and you were there from the very beginning.

Thank you to my wife, Shelly. I know you are tired of me going back to school; I promise I am done, for real this time. I am thankful for you allowing me to expend the time, money, and energy to fulfill my lifelong dream of becoming a doctor.

Lastly, a special thank you to my grandmother, Ruth. You and Grandpa were always my biggest source of encouragement. You instilled a love of learning in me that has endured throughout my life and has brought me to this point.

For my grandparents who encouraged me and made this possible. And for Mom.

ABSTRACT

Background. Colorectal cancer (CRC) is the third most commonly diagnosed type of cancer in North Dakota. It also ranks second in late-stage diagnosis among all cancers. High quality screening tests such as colonoscopy have shown to reduce CRC incidence significantly, but screening rates in North Dakota remain low. The literature is consistent in that a recommendation by a healthcare provider is the most influential factor in a patient's decision to screen.

Purpose. The purpose of this dissertation was to understand how healthcare providers perceive the barriers and facilitators that affect their decision to make CRC screening recommendations to patients. Identifying educational concepts and strategies that can be used to address needs and gaps uncovered in this study is also a priority.

Sample. A total of 43 out of 55 clinics that provide primary care services in North Dakota was invited to participate in the survey. The sample was one of convenience as the survey was distributed to the 201 healthcare providers practicing at these clinics. There was a total of 74 completed responses for a response rate of 37 percent.

Method. A survey was used to collect data from participants on their perceptions of patient-, provider-, and systems-level barriers and facilitators. Descriptive statistics were used to analyze perceptions of providers on individual items. Directional *t*-tests were used to test for an effect between the independent variable of whether the provider had completed a CRC screening test or not and the dependent variables of the six constructs

of patient-, provider-, and systems-level barriers and facilitators. Linear regression was used to test for a correlation between providers' attitudes on the efficacy of CRC screening tests and the six constructs.

Results. No statistical significance was found in the analysis using *t*-tests. Significance was found using linear regression between the independent variable of the provider's attitude on the efficacy of immunochemical fecal occult blood test/fecal immunochemical test (iFOBT/FIT) and the constructs of systems barriers, provider facilitators, and systems facilitators. The descriptive analysis did reveal practical insight that can be used to address needs and gaps as well as enhance current practice.

Keywords: barriers, cancer, colorectal, education, facilitators, healthcare providers, screening, tests

CHAPTER I

INTRODUCTION

Colorectal cancer (CRC) is the third most common type of cancer both in North Dakota and nationwide (Tran, Sayler, & Askew, 2013). Action addressing this type of cancer has been prioritized by national- and state-level organizations not only because of how common it is, but also because there exists highly effective options to screen for and prevent this type of cancer. High quality screening tests (e.g., colonoscopy) has shown to reduce CRC incidence by up to 48 percent and colorectal cancer mortality by as much as 81 percent (Jacob, Moineddin, Sutradhar, Baxter, & Urbach, 2012).

Despite the ability to detect and prevent CRC through screening, screening rates in North Dakota are among the lowest in the nation (Tran, Sayler, & Askew, 2013). It is known that a recommendation from a healthcare provider such as a physician or nurse practitioner is the most influential factor persuading patients to complete a CRC screening test (Guerra, Dominguez, & Shea, 2005; Holt, 1991; Ioannou, Chapko, & Dominitz, 2003; Myers et al., 1990; Seef et al., 2004; Wee, McCarthy, & Phillips, 2005; Zapka, Puleo, Vickers-Lahti, & Luckmann, 2002). While barriers and facilitators have been studied extensively from the patient perspective, few have focused on the provider perspective (Klabunde, Vernon, Nadel, Breen, & Seef, 2005; Vernon, 1997). The patient-, provider-, and systems-level barriers and facilitators that affect provider recommendations for CRC screening have been studied very little. Similarly, it is

unknown if the perception of those barriers and facilitators are affected by the provider's attitudes toward screening or personal experience with CRC or CRC screening.

To better understand the barriers and facilitators that affect healthcare providers' abilities to consistently recommend CRC screening to patients, the factors that are providers' perceptions of patient-, provider-, and systems-level barriers and facilitators were measured by surveying healthcare providers (i.e., physicians, physician assistants, nurse practitioners) who recommend or refer patients to screen for CRC. Additionally, the effects of the provider having completed CRC screening his or her self, having personal experience with colorectal cancer, and the provider's belief of the efficacy of CRC screening to understand how perceptions may be affected were tested.

Background Information

Definition of Key Terms

The following are definitions of key terms that are used throughout this study. Citations are included where available and appropriate.

Barriers. These are a person's beliefs about the tangible and psychological costs of an advised action. Barriers may inhibit a person taking an advised action by weakening behavioral intent (Glanz, Rimer, & Viswanath, 2008).

Colonoscopy. This is a screening test used to look for colorectal cancer. Colonoscopy lets a doctor closely see the inside of the entire colon and rectum using a small, thin, flexible tube with a video camera on the end. The doctor is looking for polyps which could be an early sign of cancer. Polyps are small growths that over time can become cancer (American Cancer Society, 2016).

Colorectal cancer. Colorectal cancer is a cancer that starts in the colon or the rectum. These cancers can also be named colon cancer or rectal cancer, depending on where they start. Colon cancer and rectal cancer are often grouped together because they have many features in common. Most colorectal cancers begin as a growth called a polyp on the inner lining of the colon or rectum (American Cancer Society, 2016).

Colorectal cancer screening. This is the process of looking for colorectal cancer in people who have no symptoms. Several tests can be used to screen for colorectal cancers. These tests can be divided into tests that can find both colorectal polyps and cancer and tests that mainly find cancer.

Facilitators. These are a person's belief in the efficacy of an advised action to reduce risk or seriousness of impact. Facilitators enhance the likelihood of a person engaging in an advised action (Glanz, Rimer, & Viswanath, 2008).

Fecal immunochemical test (FIT)/Immunochemical fecal occult blood test (iFOBT). These tests for occult (hidden) blood in the stool in a different way than a guaiac-based FOBT. This test reacts to part of the human hemoglobin protein, which is found in red blood cells. Some people may find this test easier because there are no drug or dietary restrictions and collecting the samples may be easier. This test is also less likely to react to bleeding from other parts of digestive tract, such as the stomach (American Cancer Society, 2016).

Fecal occult blood test (FOBT). The fecal occult blood test (FOBT) detects blood in the stool through a guaiac-based chemical reaction. The idea behind this test is that blood vessels in larger colorectal polyps or cancers are often fragile and easily damaged by the passage of stool. This test can't tell if the blood is from the colon or from

other parts of the digestive tract (such as the stomach). If this test is positive, a colonoscopy will be needed to find the reason for the bleeding (American Cancer Society, 2016).

Health system. This is the organization of people, institutions, and resources that deliver health care services to meet the health needs of target populations.

Healthcare provider (HCP). This is an individual who provides preventive, curative, promotional or rehabilitative health care services in a systematic way to people, families, or communities. In this study, a healthcare provider (sometimes simply “provider”), includes licensed clinicians such as physicians, physician’s assistants, and nurse-practitioners.

Self-efficacy. This is the confidence in one’s ability to take action (Glanz, Rimer, & Viswanath, 2008).

Barriers and Facilitators

The focus of this study is the barriers and facilitators which either inhibit or help healthcare providers make appropriate recommendations to patients to screen for CRC. Studies have demonstrated that interventions that focus on healthcare provider recommendations of CRC are significantly more effective than those that only focus on the patient (Burack, Gimotty, & George, 1994; Clover, Redman, Forbes, Sanson-Fisher, & Callaghan, 1996; Lance et al., 1995; Myers et al., 2004). Unfortunately, healthcare providers are not consistent in their recommendations to screen for CRC with patients who are age-eligible for screening (Ellerbeck et al., 2001; Klabunde et al., 2003; Lewis & Jensen, 1996; Shokar, Carlson, & Shokar, 2006). However, Guerra et al. (2007) — using interviews, focus groups, and chart recall — determined that there were several factors

which served as barriers and facilitators to making CRC screening recommendations and grouped them into the categories of patient, provider, and systems related factors. These categories of barriers and facilitators are important to understand because only addressing issues on one level may not affect an increase in provider recommendation rates (Guerra, 2007).

Each barrier should be addressed in a different way. Guerra et al. (2007) provides helpful insight in this area. They cite that patient barriers are most often addressed through education, which raises awareness and acceptance, and serves as a cue to action towards screening. Suggestions to address provider-level barriers include raising awareness of a healthcare provider's own rate of screening recommendations, educating about CRC screening guidelines, and encouraging the use of reminder systems. Lastly, system interventions that were identified to reduce barriers include financial incentives from insurers, enhanced use of electronic health records, and the utilization of paramedical personnel to discuss risks and benefits of CRC screening tests with patients.

Screening Tests

Screening guidelines are established by United States Preventative Services Task Force (USPSTF). The USPSTF (2016) recommends screening for colorectal cancer using fecal occult blood testing (FOBT) or colonoscopy in adults, beginning at age 50 years and continuing until age 75 years. They recommend colonoscopy once every ten years, or a FOBT annually. While the screening guidelines are meant to help providers, because of the numerous types of screening tests available, providers are still challenged to select and recommend the appropriate test at the right time.

The underuse, overuse, and misuse of CRC screening methods is also a concern (Holden, 2010). Some healthcare providers may recommend one type of test consistently regardless of whether it is the most appropriate one for the situation. This happens most often because of a lack of familiarity with the different tests and the distinct benefits and risks of each. There are varying risks, costs, and accessibility for each of the different CRC screening tests. This led the USPSTF to recommend that the choice of test be individualized to patient and healthcare settings (USPSTF, 2016).

Colonoscopy has become the CRC screening test of choice because of its ability to detect cancer and remove polyps which may turn into cancer; however, a colonoscopy is the most invasive of the screening tests, requires extensive preparation, and carries significant risk (Warren, Klabunde, & Mariotto, 2009; Zapka et al., 2012). Patients frequently cite concern over the preparation and invasiveness of the procedure (Beeker, Kraft, Southwell, & Jorgenson, 2000; Jones, Devers, Kuzel, & Woolf, 2010). Colonoscopy is also the most cost prohibitive option and the expense of screening is a commonly reported barrier to screening (Berkowitz, Hawkins, Peipens, White, & Nadel, 2008).

In contrast, FOBT offers a high level of convenience in an affordable package. The cost of screening kits is in the tens of dollars rather than the thousands, and can be sent home with patients where they can complete the test in the privacy of their own home (American Cancer Society, 2014). No bowel preparation is necessary, however patients need to complete and then return the kit to the provider's office for analysis. Low return rates on take-home FOBT kits are a challenge, as patients often cite forgetfulness or lack of time (Clavarino, Janda, Hughes, Del Mar, & Tong, 2004). The other challenge

with FOBT is that testing must be completed every year as per the USPSTF (2016) guidelines.

Both tests have risks and benefits, and healthcare providers are not all in agreement as to which screening test is best or on the efficacy of a particular test (Zapka et al., 2012). This presents a conflict between provider beliefs and the recommendations set forth by the USPSTF. While this research looks specifically at provider's beliefs toward colonoscopy, FOBT, and FIT/iFOBT, there are several other screening tests for CRC that are not currently recommended by the USPSTF that providers may favor. Additionally, systems also play an important role in establishing policy and procedures which impact many of the decisions that healthcare providers make, including CRC testing (Nodora, Martz, Ashbeck, Jacobs, Thompson, & Martinez, 2011).

Systems

The healthcare system itself has a large amount of influence on how providers operate their practice, including making recommendations for CRC screening (Price, Zapka, Edwards, & Taplin, 2010; NCI, 2005; Zapka et al., 2012; Zapka & Lemon, 2004). The healthcare system includes the policies, procedures, environments, and systems that patients, providers, and other staff work within and interact with. This may include reminder systems, electronic health records, procedure scheduling policies, screening equipment, examination rooms, and other resources. The operations of healthcare systems are not standardized in all areas. Variation exists not only between healthcare systems, but also within different branches of the same system.

Statement of the Problem

The problem this study addresses is the low rate of CRC screening in North Dakota due to a lack of proper and consistent recommendation by healthcare providers. While the discussion of and recommendation to screen for CRC by a healthcare provider has shown to be the most significant factor influencing patient screening, there is little current literature that focuses on the factors that influence the provider's decision to make CRC screening recommendations. This new perspective is intended to highlight the complex process of making appropriate and consistent CRC screening recommendations by focusing on the patient-, provider, and systems-level factors that may affect providers' decisions to make a recommendation.

There are many resources available that detail strategies to increase patient screening (ACS, 2016). These information sources largely take on a patient-centered perspective. This is not unusual, as anything health related strives to make patients the center of focus as the patient is the reason healthcare exists; however, the focus of this study is the healthcare providers and trying to connect their beliefs, perspectives, and experiences with their decisions to communicate, teach, and influence patient actions. The provider focus of this study may yield evidence that can inform policy, systems, and environmental changes to the way CRC screening is approached.

Purpose of the Study

The purpose of this study is to understand how healthcare providers perceive the barriers and facilitators that affect their decision to make colorectal cancer (CRC) screening recommendations to patients. Specifically, how providers' perceptions of patient-, provider-, and systems-level barriers inhibit their likelihood of making a CRC

screening recommendation was investigated. Likewise, how perceptions of patient-, provider-, and systems-level facilitators enhance providers' likelihoods of making CRC screening recommendations was explored.

Additionally, an investigation into how these perceptions change in relation to several independent variables was conducted. I tested the perception of barriers decrease and/or the perception of facilitators increase if the provider completed a screening test or had personal experience with CRC. I also tested to see if having a favorable or unfavorable view of CRC screening affects perceptions of barriers and facilitators.

Theoretical Framework

Social Cognitive Theory

The theoretical framework that guided this study was social cognitive theory (SCT) and theories of reasoned action (TRA) and planned behavior (TPB), particularly as they apply to health promotion and disease prevention. The key issue this framework addressed in this study is the mechanism through which healthcare providers are moved to make CRC recommendations. According to Bandura (1998), SCT has a causal structure where self-efficacy, goals, outcome expectations, and perceived facilitators and barriers regulate the motivations and actions of individuals. Ajzen and Fishbein (1980) discuss SCT regarding the role of attitude in the form of perceived outcomes and the value placed on those outcomes that influence the intention to act or engage in planned behavior (Ajzen, 1991, Ajzen & Fishbein, 1980).

In this study, the focus was on barriers and facilitators that influence healthcare provider actions as well as variables that may influence the perception of those factors. Social cognitive theory has been used extensively to help explain patient actions and

behaviors where it is the basis for health related behavioral models such as the Health Belief Model and the Self-Regulation Model of Illness as well as the Health Behavior Theory (Becker, 1974; Champion & Skinner, 2008; Noar & Zimmerman, 2005). Social cognitive theory distinguishes between different types of barriers and facilitators (Bandura, 1998). Some of the influencing factors reside in health systems with the policies and procedures that exist within the organization. Others are present within the patients and the healthcare providers themselves. As these barriers and facilitators are explored in this study, SCT provides a basis for interpreting how they relate to provider's feelings of self-efficacy. This efficacy determinant is a crucial piece in most models of health behavior and reasoned action and provides these models with explanatory and predictive power (Ajzen & Madden, 1986; deVries & Backbier, 1994; deVries, Dijkstra, & Kuhlman, 1988; Dzewaltowski, Noble, & Shaw, 1990; Kok, deVries, Mudde, & Strecher, 1991; Schwarzer, 1992; Van Ryn, Lytte, & Kirscht, 1996).

Theories of Reasoned Action and Planned Behavior

In addition to these perspectives on SCT, theory of reasoned action extends the idea of outcome expectations where behavioral intent is influenced by attitudes and subjective norms (Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975). This intention translates into behavior; however, the magnitude of the relationship is governed by the conditions of specificity, stability, and control (Fishbein & Ajzen, 1975). The implication is that intention will turn into real action more often if the individual's perception of attitudes and norms are well defined and understood, consistent, and there exists a strong feeling of control. Theory of planned behavior adds to this model of perceived behavioral control as a component that directly affects behavioral intention as well as behavior. This

additional component explains how someone with favorable attitudes and perception of norms may lack motivation for behavioral intentions and actions because of a lack of requisite resources (Bandura, Adams, Hardy, & Howells, 1980).

Research Questions

The research questions in this study address factors that affect healthcare providers' perceptions related to making recommendations to patients about CRC screening.

1. What are healthcare providers' perceptions of barriers to making CRC recommendations at the patient, provider, and systems levels?
2. What are healthcare providers' perceptions of facilitators of making CRC recommendations at the patient, provider, and systems levels?
3. What is the difference between those providers who have completed a CRC screening test and those who have not, regarding providers' perceptions of barriers and facilitators?
4. Can a provider's view on the efficacy of CRC screening predict their perceptions of barriers and facilitators?

Importance of the Study

The potential for the information that this study provides is far reaching. This study can be utilized by health systems, healthcare providers, public health workers, and health researchers. Whereas CRC screening rates in North Dakota are currently at 62 percent (ND BRFSS, 2015) and are in the lowest quartile among states (CDC, 2014), this study may allow for the development of interventions at multiple levels that will aid in increasing screening. While advancement of education, training, and changes in health

system policy and procedures are all possibilities that this study may have an impact on, the true worth of this study is how it will affect the lives of real people. If this study can ultimately contribute to increased screening, lives will be saved through early detection and prevention of CRC.

Summary

The purpose of this study is to understand how healthcare providers perceive the barriers and facilitators that affect their decision to make colorectal cancer screening recommendations to patients. Barriers and facilitators were examined at the patient, provider, and systems level and tested to see if having screened for CRC, having personal experience with CRC, or having a favorable or unfavorable view of CRC screening tests affects their perceptions. Examining this issue is important because a provider's recommendation has the most influence on a patient's decision to screen and interventions targeting providers have more impact on screening rates than targeting patients alone (Guerra et al., 2007; Guerra, Dominguez, & Shea, 2005; Holt, 1991; Ioannou, Chapko, & Dominitz, 2003; Myers et al., 1990; Seef et al., 2004; Wee, McCarthy, & Phillips, 2005; Zapka, Puleo, Vickers-Lahti, & Luckmann, 2002). The results of this research can be used for the development of education and training at patient and provider levels, as well as working on policy, systems, and environmental change strategies within health systems. The ultimate goal of this research is to contribute to the increase of CRC screening rates and the overall reduction of the incidence and mortality of CRC.

CHAPTER II

REVIEW OF THE LITERATURE

Health Education and Health Behavior

Health education is located at the confluence of social behavioral theory and health practice. While there are many descriptions of what health education is, one of the most succinct definitions is “the process of assisting individuals, acting separately or collectively, to make informed decisions about matters affecting their personal health and that of others” (National Task Force on the Preparation and Practice of Health Educators, 1985). Health education is intended to influence behavior of individuals in ways that benefit health and covers the continuum from prevention through treatment, rehabilitation, and long-term care (Glanz, Rimer, & Viswanath, 2008). In most circumstances, the behavioral focus is on the patient. In this study, the aspect of disease prevention is important as the focus is on the healthcare provider and how their actions affect the health of others.

Glanz and Rimer (1995) described health behavior as being affected by, and also affecting, multiple levels of influence. McLeroy, Bibeau, Steckler, and Glanz (1988) identified five levels of influence for health-related behaviors: (1) intrapersonal, or individual factors; (2) interpersonal factors; (3) institutional, or organizational factors; (4) community factors; and (5) public-policy factors. Much like the levels of influence, health behavior also depends on the reciprocal relationship between individuals and their

social environment (Glanz & Rimer, 1995; Stokols, Grzywacz, McMahan, & Philips, 2003). Health education draws upon a diverse profile of methods and strategies derived from theory, research, and practice within the health and social sciences in order to address these factors that determine health behavior (Glanz, Rimer, & Viswanath, 2008).

Health education is more than instructional activities and strategies aimed at changing health behavior; it includes a more comprehensive approach that utilizes public and organizational policy, economic support, media campaigns, environmental change, and community-level interventions (Glanz & Rimer, 1995). The term “health promotion” is sometimes used to describe the efforts used to affect this broader social context of health behavior. This model of health education practice emerged from the settings of communities, schools, and patient care facilities and was influenced by Kurt Lewin’s work in group process and developmental field theory (Glanz, Rimer, & Viswanath, 2008).

Changing Context of Health Education and Behavior

As the healthcare system evolves, there have been increases in the support and opportunities for health education (Glanz, Rimer, & Viswanath, 2008). A new climate that encourages participatory patient-centered approaches to communication and an emphasis on shared decision making has led to improved health outcomes and is accepted as fundamental to health practice (Arora, 2003; Edwards & Elwyn, 1999; Epstein & Street, 2007; Glanz, Rimer, & Viswanath, 2008; Levinsky, 1996). One of the fundamental changes in health education has been a transition to a focus on upstream (i.e., provider, systems, environmental) causes rather than downstream (i.e., individual) causes that expand opportunities to improve health (McKinlay & Marceau, 2000).

Griffiths (1972) wrote, “health education is concerned not only with individuals and their families, but also with the institutions and social conditions that impede or facilitate individuals toward achieving optimum health.”

Health education and health behavior interventions have been moving toward evidence-based standards and increasingly rely on quantitative research and surveillance data to inform processes and outcome goals (Lipsey, 2005; Rimer, Glanz, & Rasband, 2001). Through extensive experience in utilizing research programs to identify and establish effective health education and behavior change strategies, Randolph and Viswanath (2004) concluded that health education interventions must be carefully planned, developed from strong formative research, and be theory based. In addition, rigorous evaluation programs have been adopted to enhance quality and improvement of interventions and to further the evidence base and development of best practices (Windsor, Baranowski, Clark, & Cutter, 1984).

Colorectal Cancer and Its Impact on North Dakota

The National Cancer Institute (NCI) defines colorectal cancer (CRC) as cancer that starts in the colon or rectum. The colon and rectum are parts of the large intestine, which are part of the digestive system. Colorectal cancer starts as a growth, called a polyp, in the inner wall of the colon or rectum. Finding and removing these polyps during a colonoscopy can prevent cancer. Deaths from colorectal cancer have been reduced due to the increased use of colonoscopy and fecal occult blood tests (NCI, 2016).

Incidence and Mortality

According to the North Dakota Statewide Cancer Registry (NDSCR), colorectal cancer is the second most diagnosed cancer in North Dakota that affects both men and

women. Nationally, colorectal cancer is also second in terms of diagnosis (ACS, 2016). Between 2004-2013, the average rate of colorectal cancer was 50.9 cases per 100,000. There were a total of 3,927 new cases of colorectal cancer in this time period. While there has been a modest downward trend in CRC diagnosis over the past ten years, this is attributed to a corresponding increase in the usage of CRC screening tests (ACS, 2016).

When cancer is diagnosed at a late-stage, where the cancer has spread outside of the originating tissue, the prognosis becomes worse and rates of survival decline. If caught in the local stage, the five-year relative survival rate is 90 percent; however, if diagnosed at the distant stage, the rate drops to 12 percent (Howlader et al., 2016). In North Dakota, 43 percent of all new colorectal cancer cases are diagnosed at a late stage (NDSCR, 2016). This high rate of late-stage diagnosis coupled with the fact that there are multiple effective screening tests available to catch this cancer early are the primary reasons that CRC is a top priority for North Dakota (Tran, Sayler, & Askew, 2013). The mortality rate for CRC in North Dakota for the years 2004-2013 is 16.5 per 100,000 or 1,351 deaths over this ten-year period. Increased screening has the potential to reduce these deaths dramatically.

Colorectal Cancer Screening and its Problems

Screening Guidelines

The United States Preventative Services Task Force (USPSTF) is the organization that determines screening guidelines. The current guideline for CRC screening for persons of average risk is to start screening at age 50 and continuing to age 75 with a fecal occult blood test (FOBT) every year or a colonoscopy every ten years (USPSTF, 2015). When using an FOBT, the USPSTF recommends using high-sensitivity tests such

as the immunochemical fecal occult blood test (iFOBT or FIT) over the ordinary FOBT. For those of greater than average risk, it is recommended that individuals consult with their healthcare provider to determine the most appropriate timing and type of test.

Testing Methods

Colonoscopy is the preferred method of screening because of the ability to actually see and remove polyps before they become cancer (ACS, 2016; NCI, 2014). Using a tube-like instrument with light and a lens inserted through the rectum, the physician is able to see inside the colon and take samples or remove polyps.

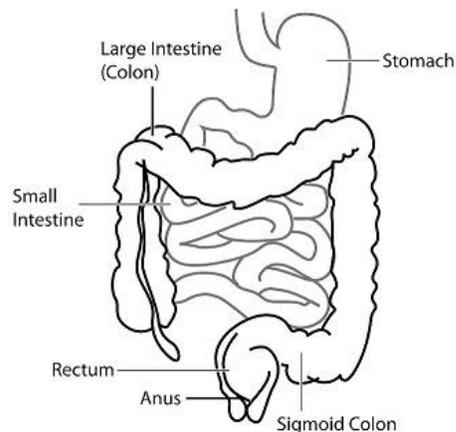


Figure 1. Structure of the colon.

Colonoscopy has shown to reduce deaths due to CRC by 60 to 70 percent; however, colonoscopy is the most invasive screening test and requires preparation of the bowel before the procedure and sedation during the procedure (Ransohoff, 2009). The cost of the procedure is also the highest which can be prohibitive to patients of lower income, those without insurance, and those who have high co-payments and deductibles (Vijan, Hwang, Hofer & Hayward, 2001; Zauber, 2010).

The fecal occult blood test involves obtaining a stool sample and checking for the presence of blood, which may indicate the presence of polyps or cancer. While the traditional FOBT is widely used and available, high-sensitivity tests that use an immunochemical process (iFOBT/FIT) are preferred because they can distinguish between blood from the colon and blood from the upper gastrointestinal tract (NCI, 2016). These tests also do not require diet restrictions prior to testing as the traditional FOBT can give false positives if red meat has been consumed. While the cost of this test is relatively low, the current USPSTF guidelines require yearly screening. If a positive result is found, a diagnostic colonoscopy is then required to confirm a diagnosis of cancer.

In addition to colonoscopy and FOBT, there are several other tests such as double-contrast barium enema, stool DNA test, and virtual colonoscopy. The evidence base for these tests is still developing and as such the USPSTF has not included them in their CRC screening recommendations guidance. However, while these tests may not be currently recommended for routine screening, these tests may still be used at the healthcare provider's discretion.

Low Screening Rates

Despite the availability of several testing options for CRC screening that have documented effectiveness, nationally, only 59 percent of those aged 50 years of age or older is in compliance with the recommended CRC screening guidelines (American Cancer Society, 2016). The National Colorectal Cancer Roundtable (NCCRT) has set a goal of increasing CRC screening rates nationwide to 80 percent by the year 2018.

Screening rates by state currently range from a low of 51 percent in Mississippi to a high of 76 percent in New York (American Cancer Society, 2016).

While the North Dakota Behavioral Risk Factor Surveillance System (ND BRFSS) survey shows screening rates in North Dakota have increased modestly from 58 percent in 2012 to 62 percent in 2014, North Dakota still ranks in the lowest quartile among states for CRC screening (ACS,2016). North Dakota has signed on to the NCCRT 80 percent by 2018 pledge as part of an effort to prioritize CRC screening among programs and partners in North Dakota. The low screening rate has also prompted the North Dakota Legislature to create a statewide screening initiative that leverages local health systems to provide CRC screening and follow-up services to low-income and uninsured individuals in North Dakota.

Healthcare Provider Attitudes and Perceptions of CRC Screening Modalities

There are a number of CRC screening modalities currently in use with colonoscopy and FOBT being the tests recommended by the USPSTF; however, the rising CRC screening rates are attributed almost completely to an increase in colonoscopy (Zapka et al., 2012). This suggests that there is a bias in the attitudes and perceptions of healthcare providers when making CRC screening recommendations. Zapka et al. (2012) found that 86 percent of providers that were surveyed strongly agreed that colonoscopy was the best available CRC screening test, and concluded that increased colonoscopy use was a result of favorable attitudes about colonoscopy.

In contrast to colonoscopy, Clavarino et al. (2004) uncovered significant provider concerns about the efficacy of FOBT during interviews and focus groups. These concerns included patient knowledge and attitudes, methods of service delivery, diet restrictions,

and patient perceptions of value. A similar study on FOBT barriers by Worthley et al. (2006) confirmed the findings of Clavarino et al. (2004), and added that greater provider involvement was needed to overcome barriers and maximize community acceptance of the test. Also of note, in McGregor, Hilsden, Murray, and Bryant (2004), there exists perceived barriers related to a lack of evidence of FOBT efficacy which conflicts with a high level of established data supporting the screening modality.

Despite the existence of provider concerns in regards to FOBT, there is ample evidence that the use of FOBT is effective in the detection of CRC and leads to significant reductions in mortality (Elmunzer et al., 2015; Jacob, Moineddin, Sutradhar, Baxter, & Urbach, 2012; Winawer et al., 1997; Zauber, 2015). This preponderance of evidence was crucial in the decision of the USPSTF to include FOBT in their CRC screening guidelines. The USPSTF guidelines on screening influence provider attitudes and perceptions and govern CRC screening policy within health systems (Anhang, Zapka, Edwards, & Taplin, 2010).

Theoretical and Conceptual Framework

There are many theories that are related to health behavior including the Health Belief Model (Becker, 1974), Social Cognitive Theory (Bandura, 1986), Theory of Reasoned Action (Ajzen & Fishbein, 1980), Theory of Planned Behavior (Ajzen & Madden, 1986), and the Transtheoretical Model (Prochaska & DiClemente, 1983). There exists significant overlap between these widely used theories, yet none are considered more effective than the others (Janz & Becker, 1984; Noar & Zimmerman, 2005). While these psychosocial theories have contributed to the field of health behavior and our understanding of how social and cognitive factors affect human health and disease,

Bandura (1998) also cautions that the proliferation of conceptual models can lead to redundancies and an unnecessary multiplication of predictors. As a comprehensive framework on health behavior, it is important to identify the overlap of similar concepts and choose a clear definition and application of theory in the framework.

The following is a discussion of Social Cognitive Theory (SCT), Theory of Reasoned Action (TRA), and Theory of Planned Behavior (TPB) as they relate to the health behavior context of this study. These three theories are substantially similar and complementary such that they are often discussed in the literature concurrently. The concepts of self-efficacy, outcome expectations, and behavioral beliefs are central to each theory and provide clear opportunity for application to health-related behavior. For these reasons, these theories have been chosen as the framework for this study.

Definitions

Social cognitive theory. Bandura (1998) states that in relation to health, “The social cognitive approach works on the demand side by helping people to stay healthy through good self-management of health habits” (p. 624). First known as “social learning theory”, social cognitive theory (SCT) is a framework with a causal structure where beliefs regarding self-efficacy interact with cognized goals, outcome expectations, and perceived barriers and facilitators to regulate individual’s motivation and action (Bandura, 1986; Bandura, 1998). In this framework, perceived self-efficacy is a pivotal factor because of its direct impact on motivation and indirect influence on other determinants (Bandura, 1977; Bandura, 1997; Bandura, 1989). Efficacy beliefs affect whether individuals make good or poor use of their skills and determine how they persevere when faced with barriers and experiences of failure.

Beliefs of self-efficacy are developed from four main sources: mastery experiences through success and failure; experience provided by social models (e.g., seeing others like themselves succeed); social persuasion through verbal reinforcement; and somatic and social states that result from physical and mental reactions to stressors (Bandura, 1997; Bandura, 1998). Through self-monitoring and reflection on these social forces, individuals form standards by which they judge themselves and determine their self-efficacy (Bandura, 1991).

Theories of reasoned action and planned behavior. The theory of reasoned action (TRA) is based on the premise that behavioral intention, the precursor to behavior, is predicated on the belief about the likelihood that performing a specific action will lead to a specific outcome (Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975). In turn, these behavioral intentions are influenced by the individual's attitude toward performing the behavior as well as the subjective norms surrounding the behavior (Fishbein & Ajzen, 1975). Fishbein (1967) also distinguishes between attitudes toward an object and attitudes toward a behavior. Attitude toward a behavior (e.g., CRC screening) is a greater predictor of that behavior than the individual's attitude toward the object (e.g., cancer) the behavior is directed at (Fishbein & Ajzen, 1975).

The theory of planned behavior is another popular conceptual framework for the study of human action that extends TRA by including the additional construct of perceived control (Ajzen, 2001; Montaña & Kasprzyk, 2008). As Ajzen (2002) explains, this theory posits that human behavior is guided by three distinct considerations: beliefs about likely consequences of an action or inaction (behavioral beliefs), beliefs about the expectations of others (normative beliefs), and beliefs about barriers and facilitators that

may affect the performance of a behavior (control beliefs). Furthermore, behavioral beliefs inform an individual's attitude toward the behavior; normative beliefs affect perceived social pressure; and control beliefs lead to the formation of behavioral intention.

Theories of reasoned action and planned behavior are linked in that reasoned action explains how certain beliefs lead to behavioral intent and action, whereas planned behavior explains the origins of those key beliefs and how they are formed. While SCT, TRA, and TPB are all distinct and complete theories, they complement each other and help to fill in critical gaps. An Integrated Behavioral Model that expands on TRA, TPB, SCT, and other behavior theories has been proposed by Fishbein (2009). The concept of self-efficacy, which is integral to each of these theories, is the thread that pulls everything together to define the causal relationships between the major components of self, the environment, and action.

Application of Theory in the Healthcare Context

Social cognitive theory addresses both personal and social determinants of health (Bandura, 1998). This is an important consideration as social determinants of health are conditions in the environments in which people are born, live, work, and play, and that affect health, functioning, and quality-of-life outcomes and risks (WHO, 2011). Through the inclusion of both personal and social/environmental factors, the use of SCT and theories of reasoned action and planned behavior provide a comprehensive framework with which to formulate the hypotheses in this study and interpret the findings.

Within the context of this study where the action of the healthcare provider is the focus, the use of these theories is new territory as the motivations of healthcare providers

and their decisions to make patient recommendations has not been studied extensively. Nonetheless, SCT and theories of reasoned action and planned behavior are frameworks that have shown to be useful in explaining behavior in a multitude of situations and contexts (Glanz, Rimer, & Viswanath, 2008). Ultimately, this framework has a strong emphasis on self-efficacy which healthcare providers experience in their practice both internally with their own self-reflection on their work, and externally, in which the healthcare system evaluates provider's performance.

From a health education perspective, SCT is helpful in understanding how individuals, environments, and health behaviors interact and also in designing interventions that address significant practical issues in public health (McAlister, Perry, & Parcel, 2008). According to Bandura (1969), behavior results from the interrelationship of a person's learning history, perceptions of the environment, and support for the development of capacities. This creates an opportunity to change health behavior by investing in new learning experiences, adjustment of perceptions, and supporting the development of personal capacity (McAlister, Perry, & Parcel, 2008). This has led to the utilization of social learning concepts to develop cognitive-behavior therapies where self-efficacy is a primary component through which treatment produces alterations to behavior (Bandura & Adams, 1977).

The component of outcome expectations is also important in consideration of the application of this study's framework in the context of health. This component is present in virtually every self-regulation and learning model (Bandura, 1969; Cacioppo et al., 1989; Kanfer, 1977). In application to health, Leventhal, Leventhal, and Contrada (2007) make the case that the complexity of outcome expectations increases in relation to the

perceived magnitude of the health behavior (i.e., taking a pill vs. surgery). When addressing CRC screening, this is highly relevant as there are multiple screening modalities that range in invasiveness. Fecal occult blood testing that can be done at home is the least invasive, while colonoscopy is the most invasive requiring advanced bowel preparation, anesthesia, and use of an operating room. Healthcare providers regulate their own outcome expectations based on patient readiness for the procedure (Phillips et al., 2007; Zapka et al., 2011; Zapka et al., 2012). This means that healthcare providers' recommendations for CRC testing may change based on what they perceive their patient's willingness to be. In turn, patient willingness to complete a specific test or procedure is informed by their own outcome expectations and perception of risks and benefits.

Another aspect of outcome expectations is the healthcare provider's perception of CRC screening test efficacy. As previously discussed, Clavarino et al. (2004), McGregor, Hilsden, Murray, and Bryant (2004), and Worthley et al. (2006) all found that healthcare providers had varying perceptions on the efficacy of FOBT, with a significant number having serious reservations. This has the potential of having a significant impact on outcome expectations for FOBT; and as a result, change the healthcare provider's recommendation. In some cases, this may mean recommending colonoscopy over FOBT; as evidenced by the increasing rate of colonoscopy use (Zapka et al., (2012). However, Philips, Reinier, Ashikaga, and Luebbbers (2005) found that screening recommendation correlates with physician beliefs. Understanding this fact, if the patient is not ready for the invasiveness of a colonoscopy, a healthcare provider may not make any

recommendation for CRC screening when the provider's perception of FOBT efficacy is in question.

Just as outcome expectations contribute to self-efficacy, the perception of barriers and facilitators is also an integral factor (Bandura, 1998). Bandura's (1998) discussion of SCT distinguishes between different types of barriers and facilitators including personal and health systems barriers. He discusses that individuals regulate their behavior by measuring their efficacy belief against perceived barriers and facilitators. Ajzen (1991) and Ajzen and Fishbein (2005) in their discussion of TRA had the same conclusion in their discussion of barriers and facilitators where self-efficacy was strengthened when individuals felt they had the resources to overcome barriers. As this relates to the current study, the measurement of healthcare providers' perception of barriers and facilitators is intended to help understand their behavior in making CRC screening recommendations.

Communities of Practice

Communities of practice (COP) are social learning systems that are formed by groups of people that share a passion for something they are engaged in and learn to improve as they interact regularly (Smith, 2009; Wenger, 2010). These communities are pervasive and most people are involved in several of them (Lave & Chaiklin, 1993; Smith, 2009; Wenger, 1998). A COP develops shared ideas, commitments, memories, and resources that carry the accumulated knowledge of the community (Smith, 2009).

The COP has three parts: the domain, the community, and the practice (Wenger & Wenger-Trayner, 2015). The domain is the shared area of interest that goes beyond ordinary friendship or association. Membership in the COP implies commitment to the domain and a shared competence. The community is defined by cooperative discussion

and activity with the purpose of sharing information and helping each other. Practice is a process of creating experiences, stories, tools, and other resources to address the issues of the domain. These three characteristics come together to create a learning experience, which is informal with a dynamic social structure (Wenger, 2010).

Lave (1991) discusses the concept of COP as an attempt to rethink learning in social, cultural, and historical terms and the understanding of learning as an experience and participation in the world. He argues that learning is not a process of socially shared cognition, but rather a process of becoming a member of a sustained COP that provides motivation and meaning to the individual. Wenger (1998, 2010) and Wenger and Wenger-Trayner (2015) wrote about meaningful learning resulting from the interplay of personal participation in social life and reification in the form of words, tools, methods, documents, and other artifacts that reflect shared experience. Communities arise from a social history of learning formed from the combination of participation and reification (Wenger 2010).

Educational Application

The field of healthcare is home to many COP ranging from the general (e.g., the ND Medical Association) to the specialized (e.g., the ND Colorectal Cancer Roundtable). Healthcare has a strong tradition of COP in which the field is rooted (Wenger, 2009). In terms of learning in the healthcare context, Wenger (2009) wrote that COP allow for the understanding of the knowledgeability of many professionals across a variety of practices and allow for the consideration of the learning dynamics of the whole system. The learning potential of the community depends on the depth of practice, active connections,

and expansion of boundaries. This uncovers additional perspectives, involves a wider range of stakeholders, and helps to bridge research and practice.

While the use of traditional continuing medical education (CME) where didactic lectures by experts is considered as an important source of learning and leads to improved performance, evaluative studies show that CME falls short of its promised goals (Parboosingh, 2002). Contrasting with Wenger, McDermott, and Snyder’s (2002) view of a natural learning model where learning and practice are inseparable within COP, Parboosingh (2002) notes several barriers that are endemic to CME. The shortcomings of CME are potentially addressed by utilizing COP to enhance learning and practice. Table 1 shows the barriers related to CME as identified by Parboosingh (2002) and how COP may address them.

Table 1
Barriers Limiting CME and the Potential for COP to Address Them

Barriers of learning through traditional CME	How learning in COP may address barriers of CME
Adoption of effective CME practices is dependent on the characteristics of the individual physician, including motivation for learning.	Adoption of effective CME practices in COP is more dependent on the characteristics of the community than on individual characteristics.
Adoption of effective CME practices in COP is more dependent on the characteristics of the community than on individual characteristics.	Relationships and interactions between peers and mentors in a COP provide the motivation for learning and high standards in practice.
Work is a barrier to learning in traditional CME as busy physicians must leave practice to attend sessions.	Practice motivates learning in physician COP.
CME-dependent learning is episodic. Topics are often presented as single events.	Learning in COP is continuous and a natural complement to practice.

Table 1. Continued

Barriers of learning through traditional CME	How learning in COP may address barriers of CME
Physicians' learning skills vary in quality. The assistance of a mentor may be difficult to obtain.	Team members support each other in learning new things. Mentors are more readily available to learners in COP.
Personal educational needs are difficult to integrate into traditional group CME.	Physicians in clinical COP are constantly reminded of their proficiency gaps as they collectively reflect on practice.
The effectiveness of traditional CME to enhance practice is difficult to document.	Monitoring and responding to changes in practice implemented as a consequence of learning are easier in COP.
Physicians use traditional CME to update their knowledge and increase their awareness of evidence-based practice guidelines.	Learning in COP not only addressed deficiencies in the practice of evidence-based medicine, but is also geared to help physicians deal with the uncertainties and ambiguities of clinical practice. This is largely acquired by communication with colleagues and the critical reconstruction of practice.

While some of Parboosingh's (2002) criticisms listed in the table are becoming outdated due to advancements in online educational technology and teaching methods, there still exists stark contrast between CME and COP. The focus of CME is on the individual and content is largely standardized to be applicable to a wide range of participants. Communities of practice focus on collective engagement, creation of shared knowledge and tools, and solutions specialized to the community's unique issues. There also exists a structure of social and professional support within COP. Where CME continues to be the standard by which clinicians are measured to maintain licensure, participation in COP are voluntary.

Parboosingh (2002) is a strong advocate of COP versus CME, however the relationship between the two approaches can be complementary rather than adversarial. If CME is viewed as a tool or process for learning at an individual level, COPs can create and inform the content, structure, and delivery of CME. With the current state of technology, CME platforms can allow participants to communicate with each other and create ad hoc COPs or connect with outside COPs. Integration of these two models of teaching and learning has not been explored explicitly in the literature, but may be a topic worthy of future study.

Factors Affecting Screening

Factors Affecting Healthcare Provider Recommendation

Steinwachs et al. (2010) found that a healthcare provider recommendation was the only provider-related factor that predicted screening. This finding underscores the importance of understanding the factors that affect healthcare providers' recommendation of colorectal cancer screening; however, Nodora et al. (2011) found that many healthcare providers were not making CRC screening recommendations in compliance with the CRC screening guidelines. Furthermore, the quality of many recommendations was found to be poor and they speculated that increasing complexity of guidelines would lead to continued decline. This led to the conclusion that healthcare providers may not agree with CRC screening guidelines, particularly those with more years of practice.

In Klabunde et al. (2003), CRC screening beliefs and practices were studied from a provider prospective covering all CRC screening modalities. Their key finding was that the CRC screening recommendations and practices reported by healthcare providers were often inconsistent with the current screening guidelines of the time. These inconsistencies

raise concerns about the appropriateness and timing of CRC screening practices in the primary care setting. There is also a question of why healthcare providers are unable to adhere to the established guidelines. Cabana et al. (1999) suggest that multiple factors play a role in creating barriers to adherence for healthcare providers including lack of awareness and familiarity, lack of self-efficacy, and lack of outcome expectancy.

Klabunde, Vernon, Nadel, Breen, Seef, and Brown (2005) continued to research the provider perspective and uncovered several barriers that providers encountered related to making CRC screening recommendations. Patient-related barriers were identified by providers most often as major barriers (80 percent), while systems-related barriers less so (68 percent). Among patient-related barriers, motivational issues such as embarrassment and anxiety were the most cited by healthcare providers. In contrast, they found that patients most often cited lack of knowledge and awareness for not being current with screening. Like Steinwachs et al. (2011), they also found that lack of a provider recommendation was the best predictor of patients not being current with CRC screening.

While Klabunde et al. (2003) and Klabunde, Vernon, Breen, Seef, and Brown (2005) used quantitative methods to come to their conclusions, Guerra et al. (2007) utilized semi-structured interviews, focus groups, and chart-recall to uncover in-depth detail of the barriers and facilitators associated with making CRC screening recommendations. The barriers and facilitators that they uncovered were broken down into three categories: patient factors, provider factors, and systems factors. Like Nordora et al. (2011), they found sub-optimal quality of recommendations. The ultimate

conclusion of Guerra et al. (2007) was that multiple barriers at multiple levels needed to be targeted in order to successfully increase CRC screening recommendations.

While Meissner, Klabunde, Breen, and Zapka (2012) came to the same conclusion as Guerra et al. (2007), they added that the messaging used to communicate to patients about CRC screening needed examination as they found that 60 percent of patients did not perceive colorectal cancer as a threat. They recognized this patient barrier specifically and point out an opportunity to educate both patients on CRC screening and healthcare providers on how to effectively communicate CRC screening options, their benefits, and risks. On this point, Lafata et al. (2011) and Ling et al. (2008) both found that discussions around CRC screening were occurring, however healthcare providers were not approaching discussion as an informed joint decision-making process with the patient. This process should include (1) providing relevant information about the clinical situation, alternatives, and risks and benefits; (2) assessing the patient's understanding; and (3) giving the patient a clear opportunity to voice a preference (Braddock et al., 1997; Braddock et al., 1999).

Also, confirming the need for a multi-level intervention to address barriers at the patient, provider and system levels, Vedel, Puts, Monette, Monette, and Bergman (2010) cited healthcare providers' lack of belief in the usefulness of CRC screening for older adults and patients' discomfort or fear of testing as the top barriers to recommending screening. In addition to barriers, several facilitators were also mentioned including accessibility of screening tests, patient insurance coverage, and presence of information systems. These findings on facilitators agreed with the findings of Guerra et al. (2007),

however in terms of increasing recommendations, the prevailing narrative is on the elimination of barriers rather than increasing facilitators.

Recommendation Patterns and Predictors of CRC Screening Participation

Further underlining the essential role that healthcare providers play in patient decision-making in regards to CRC screening, Ioannou, Chapko, and Dominitz (2003) reported that the screening rate for those who had no routine doctor's visit in the last year was 20.3 percent. This rate was lower than what they measured for those who had no medical insurance coverage (20.4 percent). In their conclusion, they noted that a routine doctor's visit was one of the most modifiable predictors of CRC screening and that this is one area that screening interventions should be focused on.

In Shokar, Carlson, and Shokar (2006), an investigation into whether the lack of a healthcare provider's recommendation or a patient's failure to comply with recommendations attributed to low CRC screening rates. Using a retrospective chart review of 400 preventative health visits, they found that providers appropriately addressed CRC screening with patients only 16.5 percent the time from 1998-1999 and 51 percent of the time from 2002-2003. This correlated with patient CRC screening rates for this group of five percent and 16.5 percent, respectively. The conclusion made in this study included a recommendation for further education to target healthcare provider barriers to making recommendations as well as patient barriers. Unfortunately, specifics as to the barriers and types of education were absent.

Also concurring with the pattern of poor recommendation practices by healthcare providers and corresponding low rates of CRC screening completion, was Seef et al. (2004). Like Ioannou, Chapko, and Dominitz (2003), they found that having had a

routine doctor's visit within the last year to be predictive of CRC screening completion; however, they also found an association with healthcare provider contact and CRC screening completion. While they could not establish causality with their study, they observed that patients with more frequent contact with healthcare providers had higher rates of CRC screening completion.

Health literacy is typically considered an important factor that affects attitudes, beliefs, and behavior related to health. In contrast to this conventional wisdom, the cross-sectional survey conducted by Guerra, Dominguez, and Shea (2005) indicated that functional health literacy was not an independent predictor of CRC screening behavior. They also found provider recommendation to be a powerful motivator of intention to complete CRC screening regardless of literacy level and recommended interventions focused on increasing provider recommendation as a more effective strategy to increasing CRC screening.

While the presence of a healthcare provider recommendation is the strongest predictor of patient CRC screening behavior, not all patients who receive a recommendation actually get screened. Through semi-structured interviews, Wackerbarth, Tarasenko, Joyce, and Haist (2007) examined the content of physician recommendations using the framework of informed decision making. Their analysis uncovered deficiencies in several areas including asking if patients had questions, discussion of patient role in screening decision, reviewing risks and benefits of screening, assessing patient understanding, presenting alternative screening options, and inquiring about patient preferences. In addition to the informed decision making criteria, they also addressed that patients base their decision-making on the presence of symptoms and the

need for discussion about asymptomatic CRC and the preventative benefits of CRC screening.

Each of these studies recognizes that healthcare provider recommendations are the best predictor of CRC screening behavior. Unfortunately, there is also an established pattern of poor recommendations by healthcare providers. This includes inappropriate timing, insufficient discussion, or a complete lack of recommendation at all. Each study observed low patient CRC screening rates that corresponded with the poor provider recommendation practices. All agree with other established literature that healthcare provider recommendation is the most influential predictor of patient screening. Healthcare provider education to address barriers to making recommendations was cited by each, but specifics were limited. While their findings and recommendations were consistent, there are opportunities to explore the barriers to making recommendations and more specific recommendations to utilize education to address them.

Factors Affecting Healthcare Provider Perceptions

The following is a discussion of the dependent and independent variables for this study. The significance and reasoning for including these variables in this study is discussed with respect to the literature.

Dependent Variables

The dependent variables include the different levels of patient, healthcare provider, and systems barriers and facilitators to making CRC screening recommendations. These three levels of barriers and facilitators were identified in Guerra et al. (2007); Klabunde et al. (2003); Meissner, Klabunde, Breen, and Zapka (2012); and Nodora et al. (2011) and informed the development of the survey instrument used in this

study. Each level is distinct and requires a different type of approach to address. With respect to the theoretical framework, barriers and facilitators are vital components in the decision-making and behavioral processes (Bandura, 1986). Understanding healthcare providers' perceptions of these components may lead to improved understanding of their behavior in regards to recommending CRC screening to patients.

Patient-level barriers and facilitators. These barriers and facilitators originate with the patient and include patient attitudes and behavior, health status, and family history (Guerra et al., 2007; Meissner, Kabunde, Breen, & Zapka, 2012). Patient barriers can be significant obstacles for healthcare providers to deal with because of the lack of control they have over a patient's health status or family history. However, as it has been discussed, healthcare providers can have significant influence over patient attitudes and beliefs (Guerra, Dominguez, & Shea, 2005; Holt, 1991; Ioannou, Chapko, & Dominitz, 2003; Myers et al., 1990; Seef et al., 2004; Wee, McCarthy, & Phillips, 2005; Zapka, Puleo, Vickers-Lahti, & Luckmann, 2002). This is further evidenced in Guerra, et al. (2007) where physicians described patient facilitators such as patient inquiry and anxious patients which depict patients' willingness to rely on physicians' expertise and advice.

Patient education is most often cited as the way to decrease patient-level barriers and increase patient-level facilitators (Glanz, Rimer, & Viswanath, 2008; Guerra et al., 2007; Klabunde et al., 2003; Meissner, Klabunde, Breen, and Zapka, 2012; Nodora et al., 2011). However, Guerra et al. (2007) makes that point that patient education not only raises awareness and acceptance among patients, but is also a cue to action for healthcare providers to discuss CRC screening. This is a significant revelation as it shows the

effectiveness of education on multiple fronts and the importance of understanding and addressing barriers and facilitators at this level.

Healthcare provider-level barriers and facilitators. At this level, the barriers and facilitators directly affect and/or are controllable by the providers themselves. This includes the providers' familiarity with CRC screening guidelines, forgetfulness, communication, choice to use available reminder and pre-screening/assessment tools, time to review patient medical records, among others (Guerra et al., 2007; Meissner, Kabunde, Breen, & Zapka, 2012). In addition, Cabana et al. (1999) classified the types of healthcare provider-level barriers in terms of knowledge, attitudes, and behaviors. Tying back to this study's theoretical framework, they also recognized a lack of self-efficacy and outcome expectations as major barriers that directly contributed to providers' lack of adherence to making proper CRC screening recommendations.

The knowledge, attitudes, and beliefs of healthcare providers have been thought to be barriers to change, however research has shown significant difficulties for providers trying to transform their routines of care (Greco & Eisenberg, 1993; Grimshaw, Eccles, Waler, & Thomas, 2002; Klabunde et al., 2007; Robertson, Baker, & Hearnshaw, 1996). Furthermore, other authors have found limited success of interventions aimed specifically at providers (Davis, Thomson, Oxman, & Haynes, 1995; Stone et al., 2002). However, Klabunde et al. (2007) recommended the utilization of practice-based learning, specifically in the areas of communication, cultural competence, and use of technology, to impact the delivery of CRC screening services despite the previously documented difficulties. They cite new evidence-based strategies found in the New Model for Primary

Practice that have shown promise in reducing provider barriers including those related to screening.

Systems-level barrier and facilitators. The disparity between healthcare providers' behavioral intentions of recommending CRC screening to patients and their actual practice largely results from an inadequate use or failure of systems (Dickey & Kamerow, 1996; Sarfaty & Wender, 2007; Wei, Ryan, Dietrich, & Colditz, 2005). Systems as a category is broad and encapsulates the policies, procedures, processes, and related resources that govern the interactions between healthcare providers and their patients. Some of the specific barriers cited by healthcare providers related to systems are type and duration of patient appointments, lack of reminder systems, difficulty accessing patient medical records, and lack of insurance coverage (Guerra et al., 2007). Facilitators in this category included the existence of reminders systems, adequate access to patient medical records, ready access to testing kits, and risk factor assessments being completed. However, having adequate time to discuss CRC screening free of other competing or acute issues, such as during an annual physical examination, is cited by several authors as perhaps the most important facilitator of CRC screening recommendation (Guerra et al., 2007; Nodora et al., 2011; Purvis Cooper, Merritt, Ross, John, & Jorgensen, 2004; Ruffin, Gorenflo, & Woodman, 2000; Sarfaty & Wender, 2007; Sox, Dietrich, Tosteson, Winchell, & Labaree, 1997).

Independent Variables

This study has two independent variables that are examined to understand their effects on the dependent variables that are the perceptions of barriers and facilitators. The theoretical frameworks in use for this research stress the importance of personal attitudes

and beliefs in the decision-making process that leads to action. How those beliefs and attitudes are shaped is important. The independent variables discussed below reflect factors that may have significant impact on healthcare providers' beliefs and perceptions of the barriers and facilitators they encounter when considering making CRC screening recommendations to patients.

Provider having had a screening test. Guerra et al. (2007) observed that a few providers who had a personal experience with CRC, whether it was screening with any of the recommended tests and/or having been diagnosed with CRC, reported that their experience led them to recommend CRC screening to all their patients. This fact leads to questioning if providers' personal experience with screening may influence their perception of barriers and facilitators and ultimately affect their CRC screening recommendation behavior; however, no follow-up research has been conducted to further explore this. If such a causal relationship existed between healthcare providers' personal experience with CRC and their CRC recommendation behavior, more effective approaches to increasing recommendations could be developed.

Literature on how personally completing screening or having other personal experiences with colorectal cancer affects healthcare provider perceptions or actions is virtually non-existent. Searches for healthcare providers' personal experiences with other types of screening or other diseases came up short as well. This is a major gap in the understanding of healthcare provider motivation; however, the observation by Guerra et al. (2007) is meaningful and would seem to fit with the framework of Social Cognitive Theory. Bandura (2001) writes that experiences shape outcome expectations and perceptions of self-efficacy; both of which directly contribute to behavioral intention and

action. The results of this study will further the understanding of the relationship between healthcare providers' personal experiences with CRC and their perceptions and help to contribute to the evidence base.

Attitudes on the efficacy of CRC screening tests. According to the theoretical framework, personal attitudes and beliefs feed into and explain behavioral intentions (Ajzen, 2002, 2011). Knowing this, understanding the beliefs and attitudes that healthcare providers have on the efficacy of CRC screening tests is important as this can shape their intentions to make CRC screening recommendations. Healthcare providers' attitude toward CRC screening is a factor that can be improved through educational interventions which makes it an attractive option to target. Authors like Klabunde et al. (2007) look to the New Model of Primary Care as a way to utilize educational and training strategies to improve understanding of CRC screening and promote a positive attitude toward frequent and consistent recommendations. Promotion of positive attitudes about CRC screening is also addressed through the public health model of policy, systems, and environmental approach strategy (Honeycutt et al., 2015).

As discussed earlier, there are mixed feelings on the effectiveness of CRC screening among healthcare providers. While some studies (Klabunde, Fram, Meadow, Jones, Nadel, & Vernon, 2003; Klabunde et al., 2007; Price, Zapka, Edwards, & Taplin, 2010) have found that providers are largely supportive and accepting of CRC screening, especially colonoscopy; others have found a significant amount of skepticism (Clavarino et al., 2004; McGregor, Hilsden, Murray, & Bryant, 2004; Workthly et al., 2006). While there is agreement that a negative attitude toward CRC screening is a barrier to healthcare

providers making appropriate and timely CRC screening recommendations, there has been no research that directly measures the effects of this attitude.

CHAPTER III

METHODS

The purpose of this study is to understand how healthcare providers perceive the barriers and facilitators that affect their decision to make colorectal cancer (CRC) screening recommendations to patients. The dependent variables are the perceived level of barriers and facilitators. These barriers and facilitators are broken down into three sub-scale constructs each: (1) patient related; (2) provider related; and (3) systems related. The independent variables are: (1) personal experience completing a CRC screening test; and (2) attitude toward the efficacy of CRC screening tests. The following outlines the methods that were used to explore these ideas.

Survey Design

The design of the survey is based on the ideas of barriers and facilitators to healthcare providers making CRC recommendations. Barriers and facilitators are each broken down into the sub-scale constructs of patient, provider, and systems related barriers and facilitators. Lastly, each construct has three to eight questions that address the major aspects of each construct.

Participants

The population for this research was licensed healthcare providers in North Dakota who recommend, order, or refer patients for CRC screening in the state of North Dakota. Healthcare providers include physicians, physician assistants, and nurse

practitioners. The sample consisted of healthcare providers employed at various major health systems, local clinics, and at the Federally Qualified Healthcare Centers (FQHCs) in North Dakota. Of these providers, primary care providers were the main focus because they have the most frequent contact with patients and are the most likely to discuss CRC screening with their patients. The only criterion for exclusion from the study was if the provider did not discuss, recommend, refer, or order any CRC screening tests with their patients.

The sample was one of convenience. There are 55 clinics in North Dakota that provide primary care services. Of those, 43 clinics (78 percent) that are affiliated with the four major health systems in North Dakota were chosen and participated in the survey. Surveys were sent to clinic managers and then distributed to providers. From the participating clinics, a sample of 201 healthcare providers was given the option to complete the survey. A total of 74 completed responses yielded a response rate of 37 percent.

Approval of the University of North Dakota Institutional Review Board and each healthcare facility was obtained to ensure the protection of human subjects. The UND IRB number for this project was IRB-201603-349.

Instrument

The instrument (see Appendix) was developed specifically for this study to address the research questions. The questions on this instrument looked at barriers and facilitators related to the specific action of making a CRC screening recommendation. According to Social Cognitive Theory, Theory of Reasoned Action, and related health behavior models, how providers perceive these barriers and facilitators can affect

motivation, feelings of self-efficacy, and intention which all directly contribute to action (Ajzen, 1991; Ajzen & Fishbein, 1980; Bandura, 1998; Champion & Skinner, 2008).

There are a total of 45 questions which include a section of demographic questions, questions relating to the independent variables, and a section that covers the dependent variables comprised of six sub-scale constructs.

Dependent Variables

The dependent variables are separated into six sub-scale constructs. These constructs are patient-, provider-, and systems-level barriers and patient-, provider-, and systems-level facilitators. According to Bandura's (1998) discussion of SCT and health, the execution of healthful behavior is affected by barriers and facilitators that play a role in the regulation of motivation. He explains that these barriers and facilitators may be personal, situational, or be related to the health system. These constructs are also present in Health Belief Model as part of the individual beliefs that drive individual health behavior and are in turn affected by modifying factors such as individual experience (Champion & Skinner, 2008; Rosenstock, 1974). In this study, the experience of completing a CRC screening test or not is a factor that will be examined to see if there is an effect on the dependent variables.

For each construct, participants are asked to rate their level of agreement with a series of statements using a six-point Likert-type scale with 1 = strongly disagree, 2 = disagree, 3 = slightly disagree (all some form of disagreement), 4 = slightly agree, 5 = agree, 6 = strongly agree (all some form of agreement). The questions for each of these constructs was derived from the findings of Guerra et al. (2007) in their qualitative study on barriers and facilitators to making CRC screening recommendations. These individual

factors were identified in their study using semi-structured interviews, chart-stimulated recall, and focus groups. I have adapted their findings to each of the following constructs.

Patient-level constructs. The constructs related to patients include questions addressing patient knowledge, attitudes, beliefs, and actions, as well as patient health issues that may inform the perceptions of barriers and facilitators. Patient-level barriers and facilitators may represent opportunities for education, awareness, and cues to action for providers to offer CRC screening.

Provider-level constructs. The questions included in these constructs relate to the provider's own knowledge, abilities, and the processes and procedures which they have personal control over. These questions will highlight the provider's self-awareness of their practice as related to patients who may need CRC screening.

Systems-level constructs. The systems-level constructs include a broad array of questioning that include policies, procedures, funding, communications, insurance, information systems, and other resources. These elements influence the system of intervention that is utilized in addressing CRC screening for patients within the larger healthcare system.

Independent Variables

The independent variables can be considered to be modifying factors as described in the Health Belief Model that may influence the providers' individual beliefs (Becker, 1974; Champion & Skinner, 2008; Rosenstock, 1974). There are two independent variables that will be used in analysis for this study.

The first independent variable is whether the participant has ever completed a CRC screening test and the related question is designed with yes or no options. The other

independent variables relate to the providers' view on the efficacy of the CRC screening tests of colonoscopy, FOBT, and FIT/iFOBT. The survey questions ask the participant if they have a favorable or unfavorable view of colonoscopy, FOBT, and FIT/iFOBT.

Procedures

Approval to conduct the survey was required at each of the facilities. I contacted and worked with the clinic managers, administrators, and IRBs to acquire all approvals necessary. The clinic managers and administrators helped to identify the providers at their facility who met the criteria for participation and distributed the survey link. They also informed potential participants of the scope and purpose of the survey and encouraged them to participate.

Participants were provided with a link via email to access the survey from their clinic manager or administrator. The survey included instructions informing the participant of the purpose of the survey, how their response information would be handled, and procedures on how to complete the survey. Participants were only able to access and complete the survey once. At the end of the survey, the participant's responses were submitted and recorded. Once the data collection period was completed, compiled data was exported from Qualtrics for analysis using SPSS software. There was no single state-wide data collection period. Instead, each individual facility was given a certain timeframe for response collection after approval to conduct the survey was granted.

Data Analysis

Reliability and Validity

Before performing any tests, a factor analysis was completed to aid in the evaluation of constructs. For each of the dependent variable sub-scale constructs, the responses were averaged for analysis at the construct level. Reliability testing using Cronbach's Alpha was completed for each of the sub-scale constructs to test the internal consistency and get an indication of the level of reliability of the results. Cronbach's Alpha for the six constructs ranged from .44 to .84 with only one result below .67. With a standard of .70 or higher, this indicates acceptable reliability for each construct except for provider-level facilitators.

To address content validity, previous research by Guerra et al., (2007); Klabunde et al. (2003), Meissner, Klabunde, Breen, and Zapka (2012); and Nodora et al. (2011) was reviewed and used as the basis for developing the constructs and individual questions. The literature was cross-referenced to ensure validity as it relates to the defined constructs as well as consistent and uniform results.

Questions 1 & 2: What are healthcare providers' perceptions of barriers to and facilitators of making CRC recommendations at the patient, provider, and systems levels?

Descriptive statistics including mean, standard deviation, and the percentage of agreement with each individual statement were calculated. These statistics indicate how healthcare providers perceive the various barriers and facilitators as well as the variance of the responses.

Question 3: What effect does a provider having completed a CRC screening test have on providers' perceptions of barriers and facilitators?

The six sub-scale constructs of patient-, provider-, and systems-level barriers; and patient-, provider-, and systems-level facilitators; were the dependent variables for use in an analysis of variance. The independent variable was whether or not the provider has personally undergone a CRC screening test. The hypothesis is that healthcare providers who have completed a CRC screening test will have a lower perception of barriers and a higher perception of facilitators. To test this hypothesis, one-way ANOVA was used for analysis. An alpha-level of .05 was used to determine significance.

The rationale for the hypothesis is that the experience of completing a CRC test may be significant factor in shaping healthcare providers' perceptions. Within the framework of Social Cognitive Theory (SCT) used for this study, there are several components that work together to influence personal behavior (Ajzen & Fishbein, 1980; Bandura, 1998). Perceived barriers and facilitators are one component and can be influenced by certain factors such as personal experience. The personal experience of completing a CRC screening test may provide healthcare providers with a perspective which may cause an effect on their perceptions of barriers to and facilitators of making CRC screening recommendations.

Question 4: Can a provider's view on the efficacy of CRC screening predict their perceptions of barriers and facilitators?

Independent variables used in this analysis are providers' view of FOBT, FIT, and colonoscopy as either favorable or unfavorable. The dependent variables are the sub-scale constructs of patient-, provider-, and systems-level barriers; and patient-, provider-, and

systems-level facilitators. Regression analysis was used to see if there is a linear predictive relationship between the independent and dependent variables. The hypothesis for this question is that a positive favorability would correlate to lower perceptions of barriers and higher perceptions of facilitators. An alpha-level of .05 was used to determine significance.

The rationale for this hypothesis is that within the framework of SCT, TRA, TPB, beliefs and attitudes play a role in shaping perceptions and in-turn, behavioral intentions (Ajzen & Fishbein, 1980; Bandura, 1998). The Health Belief Model which is based upon SCT shows that beliefs have an influence over the perception of individual beliefs such as perceived barriers and perceived facilitators (see figure 2). Efficacy beliefs, or the belief that one is able to effect a change, is particularly important in motivating and regulating behavior (Bandura, 1977; Bandura, 1991). With this framework, an unfavorable attitude on the efficacy of a CRC screening test may predict higher perceived barriers and lower perceived facilitators.

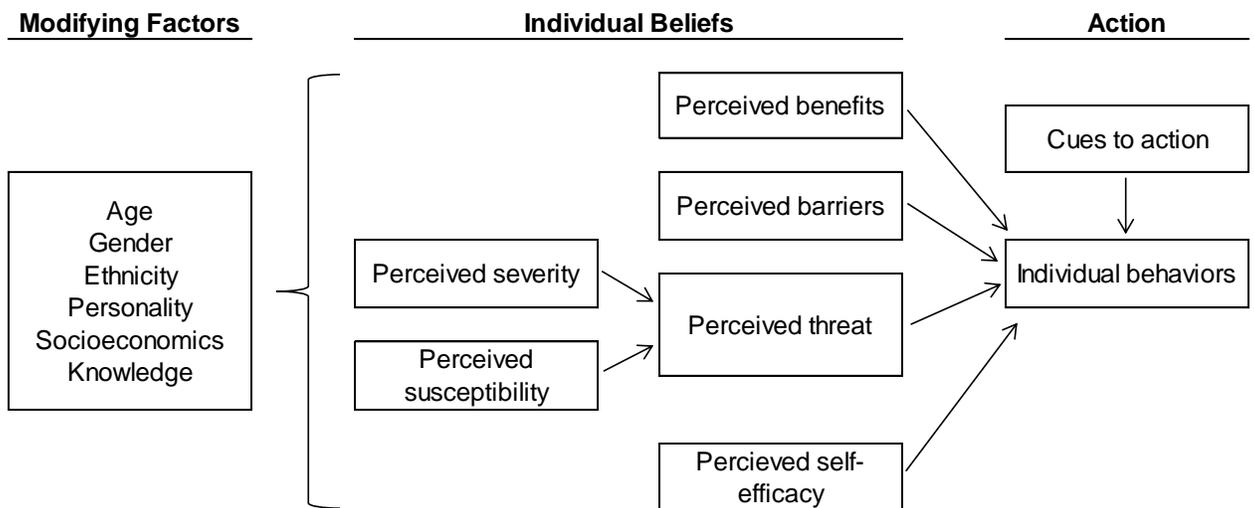


Figure 2. Health belief model components and linkages

Summary

The purpose of this study is to understand how healthcare providers perceive the barriers and facilitators that affect their decision to make colorectal cancer screening recommendations to patients. To do that, I utilized a survey based on key constructs to CRC recommendations and their components of patient, provider, and systems barriers and facilitators. The population consists of licensed healthcare providers in North Dakota who discuss, recommend, order, or refer patients for CRC screening. The sample consisted of primary care providers, who are the most likely to be engaging patients about CRC screening. The analysis of the data included descriptive statistics, *t*-tests, and linear regression tests.

CHAPTER IV

RESULTS

The purpose of this study is to understand how healthcare providers perceive the barriers and facilitators that affect their decision to make colorectal cancer (CRC) screening recommendations to patients. To achieve this understanding, testing was performed to see whether there was a relationship between a healthcare provider completing a CRC screening test and their perceptions of barriers and facilitators. The hypothesis was that healthcare providers who have completed a CRC screening test will have a lower perception of barriers and a higher perception of facilitators. There was also an examination into whether there was a correlation with a healthcare provider's attitude on the efficacy on CRC screening tests and their perceptions of barriers and facilitators. The hypothesis for this question was that a positive favorability would correlate to lower perceptions of barriers and higher perceptions of facilitators.

The survey included a section of demographic questions, a section of research questions that included questions related to the independent variables as well as other questions not included in the main study, and a section of questions related to the dependent variables of barriers and facilitators. The findings for each of these questions are reported in the following section. For a complete description of methods, please see Chapter III.

Survey Results

Demographics

The demographics of the sample are included in Table 2 and includes sex, age, type of training, years in practice, and specialty. As the survey data shows, almost two-thirds of the participants were female. Over one-third of study participants were under 40 years old and almost as many were in the 50-59 age group. The 40-49 and 60-plus age groups were slightly less represented in the sample. Just over half of the participants identified themselves as being a physician with the next highest identification being nurse practitioner at 27.8 percent. Three participants identified as being nurses and are categorized as “Other” in the table. Over one-third of participants had less than five years of experience in their practice. A large majority (70.4 percent) of the participants named family practice as their specialty area with internal medicine a distant second at 15.5 percent.

Table 2
Demographic Information of Sample (N=74)

Question	%	N
1. Sex		
Male	35.1	26
Female	64.9	48
2. Age		
Under 40	35.1	26
40 – 49	20.3	15
50 – 59	29.7	22
60+	14.9	11
3. Which of the following best describes your training?		
Physician	51.4	37
Physician’s Assistant	16.7	12
Nurse Practitioner	27.8	20
Other	4.2	3

Table 2. Continued

Question	%	N
4. How many years have you practiced since finishing your training?		
Less than 5 years	37.5	27
5 – 10 years	9.7	7
10 – 15 years	8.3	6
15 – 20 years	20.8	15
20 years or more	23.6	17
5. Specialty		
Family Practice	70.4	50
General Practice	2.8	2
Internal Medicine	15.5	11
OB/GYN	5.6	4
Other	5.6	4

Descriptive Statistics of Research Questions

Over half of respondents noted having had a colorectal cancer screening test. Of those, more than half had been screened by colonoscopy. Fecal occult blood test (FOBT) was second and iFOBT/FIT, despite its status as a high-quality test, was last at less than five percent. A large majority of respondents indicated they have had a personal experience regarding colorectal cancer. Attitude toward the recommendation of CRC screening tests was overwhelmingly positive with only a small percentage being neutral on the subject and no one responding with a negative attitude.

Attitudes on the efficacy of the individual tests showed that 100 percent of respondents viewed colonoscopy favorably. The favorability related to FOBT was split fairly even while iFOBT/FIT had a level of favorability three times greater than its level of unfavorability. Colonoscopy is the test most recommended by healthcare providers. However, despite FOBT having mixed favorability and iFOBT having largely positive

favorability, FOBT was reported as being recommended nearly three times as often as iFOBT/FIT. Screening tests in the “other” category such as virtual colonoscopy, were reported to be recommended more often than iFOBT/FIT.

In Table 3 below, questions 7 through 11 do not directly relate to the four main questions of this study as this survey was also part of an evaluation for the North Dakota Department of Health. This data is discussed peripherally in Chapter V.

Table 3
Descriptive Statistics of Research Questions

Question	%	N
6. How you personally undergone screening for colorectal cancer?		
Yes	54.9	39
No	45.1	32
7. Which colorectal cancer screening test(s) have you had?		
Colonoscopy	54.8	34
Fecal Occult Blood Test (FOBT)	27.4	17
iFOBT/FIT	4.8	3
Flexible Sigmoidoscopy	11.3	7
Other	1.6	1
8. Have you had any personal experiences regarding colorectal cancer?		
Yes	85.9	61
No	14.1	10
9. Which colorectal cancer screening test do you most often recommend for average-risk patients?		
Colonoscopy	77.5	55
Fecal Occult Blood Test (FOBT)	11.3	8
iFOBT/FIT	4.2	3
Other	7.0	5
10. How often do you present more than one screening test option when discussing colorectal cancer screening?		
Rarely	19.7	14
Sometimes	31.0	22
Usually	49.3	35

Table 3. Continued

Question	%	N
11. How would you describe your attitude toward recommending colorectal cancer screening tests to patients?		
Positive	94.4	68
Neutral	5.6	4
Negative	0.0	0
12. How would you describe the efficacy of colonoscopy?		
Favorable	100.0	70
Unfavorable	0.0	0
13. How would you describe the efficacy of Fecal Occult Blood Tests (FOBT)?		
Favorable	52.1	37
Unfavorable	47.9	34
14. How would you describe the efficacy of iFOBT/FIT?		
Favorable	74.2	49
Unfavorable	25.8	17

Descriptive Statistics of Barriers and Facilitators

The individual questions relating to barriers and facilitators were each analyzed to determine some form of agreement (slightly agree, agree, strongly agree), the overall mean of question responses, and the standard deviation of the responses. The results for the analysis of barriers are shown in Table 4 and results for analysis of facilitators is shown in Table 5.

Table 4.

Descriptive Statistics Related to Patient, Healthcare Provider, and Systems Barriers

Question	% of Some Form of Agreement	M	SD
Patient Barriers			
15. The presence of patient comorbidities has caused me to defer or miss discussion of colorectal cancer screening during patient visits.	47.8	3.0	1.4
16. A patient's previous refusal to comply with screening recommendations has caused me to defer or miss discussion of colorectal cancer screening during patient visits.	30.4	2.6	1.4
17. Having a patient that is "distrusting" or "anti-medicine" has caused me to defer or miss discussion of colorectal cancer screening during patient visits.	24.6	2.3	1.4
18. A patient who is not up-to-date with other cancer screening (e.g., mammography, prostate screening test) has caused me to defer or miss discussion of colorectal cancer screening during patient visits.	10.1	2.0	1.1
Healthcare Provider Barriers			
19. Concurrent care provided by a gastroenterologist or other specialist has caused me to defer or miss discussion of colorectal cancer screening with patients.	30.9	2.7	1.5
20. I sometimes forget to discuss colorectal cancer screening with patients.	40.6	2.9	1.3
21. If a patient is scheduled for a full examination at a future visit, I may defer discussion of colorectal cancer screening.	75.4	3.9	1.3
22. Being tired or fatigued has caused me to defer or miss discussion of colorectal cancer screening with patients.	18.8	2.2	1.2
Systems Barriers			
23. It is challenging to recommend colorectal cancer screening during an acute care visit and may cause me to defer or miss discussion of colorectal cancer screening with patients.	73.9	4.1	1.4

Table 4. Continued

Question	% of Some Form of Agreement	M	SD
24. Limited time during patient visits has caused me to defer or miss discussion of colorectal cancer screening with patients.	56.5	3.6	1.3
25. A lack of reminder systems has caused me to defer or miss discussion of colorectal cancer screening with patients.	36.2	3.0	1.4
26. Inability to track down prior dates of screening has caused me to defer or miss discussion of colorectal cancer screening with patients.	53.6	3.4	1.4
27. Awareness of a patient's insurance status has caused me to defer or miss discussion of colorectal cancer screening with patients.	33.3	2.8	1.6

In the results for barriers, only two questions had a mean that may be considered to indicate general agreement. The rest of the questions had a mean that indicated an average that disagreed with the statement or was neutral (a mean of 3.5 would be neutral). When the percent of agreement was examined, most results may be considered practically significant because of the need to be consistent with recommendations; so even percentages less than 30 can be important to address. While each barrier separately may affect a relatively small percentage of respondents, when combined, the barriers form a network of challenges that all need to be addressed to have consistent recommendations. Thus, each of these barriers shows a perception which may indicate opportunities to use education and training to reduce those barriers.

Questions 21 and 23 had the highest percentage of agreement with both having approximately three out of four respondents agreeing. These two are of note because they

both relate to the type and purpose of appointments. Question 21 indicated that most healthcare providers would prefer to wait to discuss CRC screening during a full examination, whereas question 23 indicates that most providers would rather not discuss CRC screening during a visit for an acute issue. These barriers both speak to the ability of healthcare providers being able to make timely recommendations.

Another striking result was the percentage of respondents who agreed that they forget to discuss CRC recommendations at over 40 percent. However, when you look at the other barriers described in this study, there is a pattern of competing priorities and it becomes easier to understand how the level of forgetfulness is perhaps more reasonable than at first glance.

Table 5
Descriptive Statistics Related to Patient, Healthcare Provider, and Systems Facilitators

Question	% of Agreement	M	SD
Patient Facilitators			
28. I am more likely to discuss or recommend a colorectal cancer screening test if the patient inquires about it or makes a request.	59.4	3.8	1.8
29. I am more likely to discuss or recommend a colorectal cancer screening test if the patient is aged 50-59 than those aged 60 or older.	22.9	2.6	1.4
30. I am more likely to discuss or recommend a colorectal cancer screening test if the patient is healthy or medically stable.	36.2	3.0	1.5
31. I am more likely to discuss or recommend a colorectal cancer screening test if the patient has a history of cancer.	57.1	3.6	1.8

Table 5. Continued

Question	% of Agreement	M	SD
32. I am more likely to discuss or recommend colorectal cancer screening if the patient is a woman.	13.2	2.2	1.2
33. I am more likely to discuss or recommend a colorectal cancer screening test if the patient is anxious or the “worrying type”.	18.8	2.3	1.3
Healthcare Provider Facilitators			
34. I am more likely to discuss or recommend a colorectal cancer screening test when I have time to review the patient’s chart before or during the encounter.	62.3	3.8	1.6
35. I am more likely to discuss or recommend a colorectal cancer screening test when I use an algorithm or routine checklist for screening when with a patient.	71.0	4.1	1.5
36. Familiarity with colorectal cancer screening guidelines helps me to discuss or recommend colorectal cancer screening tests.	95.6	5.0	1.1
Systems facilitators			
37. I am more likely to discuss or recommend a colorectal cancer screening test when I see a patient for an annual physical.	95.7	5.3	1.0
38. I am more likely to discuss or recommend a colorectal cancer screening test when there is a reminder (e.g., flow sheet, survey, electronic reminder)	82.9	4.7	1.4
39. I am more likely to discuss or recommend a colorectal cancer screening test if there is a FOBT/iFOBT/FIT kit available in the exam room.	48.6	3.4	1.7
40. I am more likely to discuss or recommend a colorectal cancer screening test when there are incentives available from insurers.	27.5	2.6	1.6

Table 5. Continued

Question	% of Agreement	M	SD
41. I am more likely to discuss or recommend a colorectal cancer screening test when teaching residents.	32.4	2.9	1.5
42. I am more likely to discuss or recommend a colorectal cancer screening test if the patient is being scheduled for another procedure such as an upper endoscopy.	51.4	3.3	1.6
43. I am more likely to discuss or recommend a colorectal cancer screening test when there is a public education campaign currently running.	24.6	2.6	1.4
44. I am more likely to discuss or recommend a colorectal cancer screening test if a patient risk factor assessment has been completed.	55.7	3.5	1.5

Results for facilitators showed several items with a high percentage of agreement and mean value, especially in the healthcare provider and systems categories. High percentage of agreement and mean indicate which facilitators are perceived to be the most helpful in making a CRC recommendation. As with the results of the barriers, these results indicate several items that can be enhanced through training and education at each of the three levels. Many of these facilitators directly affect one or more of the barriers that were listed. For example, question 38 related to the use of reminder systems can directly reduce the barrier described in question 20 where a provider may forget to discuss screening. In this way, many of the facilitators are solutions for the barriers and the results show how good of a solution the respondents view them as.

The facilitators of being familiar with CRC screening guidelines (question 36) and seeing a patient for an annual physical (question 37) both had over 95 percent

agreement. Having a reminder system (question 38) was also very high (82.9 percent). Contrasting with this, the patient being a woman (question 32) and the patient being “the worrying type” (question 33) showed the lowest levels of agreement, both under 20 percent. Only about a quarter of respondents agreed with the use of incentive from insurers (question 40) and public information campaigns (question 43) as facilitators.

The results of question 31, related to a family history of cancer, had surprising results. Those with family history of cancer have a much higher risk and the expectation was that the level of agreement would be high; however, the results of 57 percent of agreement, a mean of 3.6, and standard deviation of 1.8 (highest among facilitators) seem to show a mixed perception at best. One way to interpret this result is that many healthcare providers may view discussion of CRC screening as equally important no matter the patient’s level of risk.

Reliability, Correlation of Constructs, and Validity

The reliabilities and correlations for barrier-related constructs and facilitator-related constructs are shown in Tables 6 and 7 respectively. Cronbach’s Alpha reliability coefficient was calculated for each. Construct three related to systems barriers had a Cronbach’s Alpha that was slightly below the range of .70 to .90; a range which would indicate good reliability. The Cronbach’s Alpha for construct 5 related to healthcare provider facilitators was quite low (.44) and fell well below the threshold for good reliability. Dropping items from this construct did not improve its reliability. All other constructs demonstrated acceptable reliabilities as measured by their Cronbach’s Alpha.

Table 6

Correlation of Scale Constructs and Measures of Internal Consistency for Barriers

Construct		C1	C2	α
Number	Constructs			
C1	Patient (Q15 – Q18)			.82
C2	Healthcare Provider (Q19 – Q22)	.59*		.72
C3	System (Q23 – Q27)	.33*	.42*	.67

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

Table 7

Correlation of Scale Constructs and Measures of Internal Consistency for Facilitators

Construct		C4	C5	α
Number	Constructs			
C4	Patient (Q28 – Q33)			.84
C5	Healthcare Provider (Q34 – Q36)	.39*		.44
C6	System (Q37 – Q44)	.54*	.47*	.81

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

Content validity relates to the conceptual validity of measured content; instrument questions should be relevant to the phenomena being researched (Creswell, 2013).

Previous research was reviewed and used as the basis for developing the constructs and individual questions (Guerra et al., 2007; Klabunde et al., 2003, Meissner, Klabunde, Breen, and Zapka, 2012; and Nodora et al., 2011). The literature was carefully consulted and cross-referenced to ensure validity as it relates to the defined constructs as well as consistent and uniform results.

Analysis of Variance

To answer research question three, one-way ANOVA was used to test if there was a relationship between the independent variable of whether a healthcare provider had undergone a colorectal cancer (CRC) screening test and the dependent variables of the constructs of barriers and facilitators to making CRC screening recommendations. No

statistical significance was found to support a relationship between these variables; however, the effect size for these tests were low to very low as measured by Cohen’s *d*.

Table 8
Results of One-Way ANOVA and Measures of Effect Size

Independent Variable	Dependent Variable (Construct)	<i>df</i>	<i>t</i>	<i>p</i>	<i>d</i>
Q7. Have you personally undergone screening for CRC?	C1. Patient Barriers	66	0.45	.89	-0.03
	C2. Healthcare Provider Barriers	66	1.63	.11	-0.40
	C3. Systems Barriers	66	0.24	.80	-0.06
	C4. Patient Facilitators	66	1.81	.08	-0.45
	C5. Healthcare Provider Facilitators	65	1.42	.16	-0.36
	C6. Systems Facilitators	66	1.33	.19	-0.33

Linear Regression Analysis

To test research question four, whether a correlation exists between the independent variable of the providers’ attitudes toward the efficacy of a CRC screening test and the dependent variables — the constructs of barriers and facilitators — an analysis utilizing regression was employed. There were three CRC screening tests — colonoscopy, FOBT, and iFOBT/FIT — for which respondents were asked about their favorability. Each of these was tested for correlations with the six constructs of patient, provider, and systems-level barriers and facilitators.

In the analysis of the results, we found that all respondents answered question 12 — asking the provider’s attitude on the efficacy colonoscopy — the same; they all answered that they had a favorable attitude. Analysis using that variable was not able to be completed because of the completely uniform response. Statistical significance was found when looking at the favorability of iFOBT/FIT with the constructs of systems barriers, systems facilitators, and healthcare provider facilitators. Table 9 shows the

results of this analysis. There was no statistical significance found utilizing the independent variable of FOBT (no table shown for those results).

Table 9
Results of Linear Regression Analysis Overall Model

Independent Variable	Dependent Variable (Construct)	<i>df</i>	<i>t</i>	<i>p</i>	<i>r</i>	<i>r</i> ²
Q14. Respondent's attitude on the efficacy of iFOBT/FIT	C3. Systems Barriers	62	2.59	.01	.31	.10
	C5. Healthcare Provider Facilitators	62	2.52	.02	.31	.09
	C6. Systems Facilitators	62	2.12	.04	.26	.07

While statistical significance was found between these variables, the r-squared value – the percent of variation about the mean explained by the model – is ten percent or less in each case. This means that the respondent's attitude on the efficacy of iFOBT/FIT only explains a relatively small amount of the variation in responses and does not yield a convincing predictive value. However, within the context of predicting human behavior, a low R-squared value is expected as behavior is complex and harder to predict than physical processes. Nonetheless, the statistical significance establishes a relationship between the variables and can provide useful information and context for further discussion.

CHAPTER V

DISCUSSION

This section addresses each research question in detail by examining specific findings from the data and synthesizing conclusions by connecting back to the relevant literature previously discussed in Chapter II. Implications for practice will also be developed and discussed to progress the important issue of colorectal cancer (CRC) screening. Throughout this dialog, the role of education in the context of health practice and health behavior will be a central theme.

The purpose of this study is to understand the barriers and facilitators that affect healthcare providers in making recommendations for colorectal cancer screening. First was an examination of the perceptions of individual barriers and facilitators. Following that was a higher-level investigation into the constructs of patient-, healthcare provider-, and systems-level barriers and facilitators and the effects that individual experiences and attitudes had their perceptions of those constructs. Specifically, does a healthcare provider's experience in completing a CRC screening test affect their perceptions and can their attitudes on colonoscopy, FOBT, and iFOBT/FIT predict perceptions?

Research Question One

What are the perceptions of patient-, provider-, and systems-related barriers by healthcare providers? In answering this question, it is first important to understand what is practically significant in this context. The most influential factor in a patient's decision

to complete a CRC screening test is a recommendation from their healthcare provider (Guerra, Dominguez, & Shea, 2005; Holt, 1991; Ioannou, Chapko, & Dominitz, 2003; Myers et al., 1990; Seef et al., 2004; Wee, McCarthy, & Phillips, 2005; Zapka, Puleo, Vickers-Lahti, & Luckmann, 2002). Moreover, the more consistent and frequent those recommendations are, the more likely patients are to screen (Klabunde et al., 2003; Klabunde, Vernon, Nadel, Breen, & Seef, 2005; Zapka et al. 2012).

The results from this study show the percent of agreement with each individual barrier, ranging from ten percent to 74 percent. While items that scored the highest may have a higher priority when developing educational interventions to reduce barriers, the fact that these barriers are not experienced singularly, but more often concurrently, means that the cumulative effect of these barriers needs to be considered in their effect on the consistency, frequency, and appropriateness of CRC recommendations. Thus, the argument is that even barriers that affect a relatively few healthcare providers can be practically significant because of the sum effect of multiple barriers. Both Guerra et al. (2007) and Meisser, Klabunde, Breen, and Zapka (2012) stated in their conclusions that a multifaceted approach would be needed to effectively raise CRC screening rates. Considering the number and pervasiveness of the barriers revealed in this study, the conclusion of needing comprehensive interventions that address multiple barriers supports the current understanding that is present in the literature.

The barriers selected for examination for this study were based upon the qualitative findings from Guerra et al. (2007) and were supported by Klabunde et al. (2003); Meissner, Klabunde, Breen, and Zapka (2012); and Nodora et al. (2011). The findings regarding the existence and severity of barriers from this study are largely

consistent with what these authors had previously uncovered. However, their conclusions focused on different priorities including the changing and complexity of guidelines (Nodora et al., 2011), raising awareness and acceptance of CRC screening through patient education (Guerra et al., 2007), and healthcare provider incentives to discuss CRC screening (Meissner, Klabunde, Breen, & Zapka, 2012).

From the unique perspective of education that this study takes, the barriers point to a fundamental flaw in the structure and purpose of healthcare provider visits. From the results, there are relatively high percentages of agreement for the barriers of comorbidities (Q15), patient scheduled for a full exam in the future (Q21), acute care visits (Q23), and limited time (Q24). While examining these barriers, a theme of competing priorities coupled with time restrictions emerges. In practice, this means that patient needs are triaged. Discussion of routine screenings — such as colorectal cancer screening — are often placed at a low priority and either skipped or shifted to a future appointment. In an emergency room, a triage approach is appropriate and necessary. However, in a primary care setting, there are opportunities to address the more routine issues that patients face.

Implementation of protocols for addressing CRC screening and other routine needs could provide an effective structure that can relieve barriers, increase consistency of recommendations, and still allow for the provider to respond to urgent patient concerns. This type of protocol should create an educative environment that cultivates dialog, feedback, and accountability with the patient. Guerra et al. (2007) noted that patients who are proactive and engaged during their office visit are a facilitator to the discussion of CRC screening. Changing the dynamic of the typical doctor visit to develop

these patient qualities through learning and education could go a long way towards alleviating the barrier of competing priorities by reframing the patient's perspective on health.

To accomplish such a shift in protocol, a change in policy and/or procedure would be necessary. However, prerequisite to any policy or procedure change, a transition in attitudes and priorities needs to take place to stimulate the desire for change. This leads us back to the role of education and its primacy in shaping the beliefs and attitudes of people. Rethinking the way healthcare providers approach patient visits and affecting system-wide or statewide changes necessitates a strong mechanism to educate, train, and influence practitioners. Lave (1991) advanced the idea that communities of practice (COP) provide meaning and motivation to the members of the community of practice. Utilizing communities of practice affords an opportunity to build a consensus for change through regular dialog and an effective way to develop the tools and processes needed to implement new strategies (Wenger, 2010; Wenger & Wenger-Trayner, 2015).

In contrast to the usual practice of implementing change in healthcare systems where a top-down policy centered approach is common, COP create a grassroots-style dynamic of change that builds acceptance and support from practitioners through a more organic learning experience with their peers. This also creates an advantage in being able to affect change across health systems simultaneously while avoiding bureaucracy. In a way, adopting this type of bottom-up, grassroots-style approach turns the COP into a viral host of infectious ideas, practices, and information. As the COP cultivates a mass of engaged and passionate members, those members transmit their energy, passion, and the

community driven standards they developed to colleagues in other COP and the health systems in which they work.

Research Question Two

What are the perceptions of patient-, provider-, and systems-related facilitators by healthcare providers? While the reduction of barriers is always a priority in public health improvement strategy, the support and promotion of facilitators can have as much or more of an impact on outcomes (Glanz, Rimer, & Viswanath, 2008). Consistent with Guerra et al. (2007), highly rated facilitators included reminder systems, having a patient come in for an annual physical, having a patient request or inquire about screening, and having time to review a patient's chart. In contrast, there were several facilitators that rated highly that were not identified by Guerra et al. (2007). These included the use and availability of a checklist or algorithm, familiarity with the screening guidelines, and the use of a risk factor assessment. However, these facilitators are discussed as effective strategies for CRC screening rate improvement by the National Colorectal Cancer Roundtable (NCCRT), American Cancer Society (ACS), and Centers for Disease Control and Prevention (CDC) (Sarfaty, 2008).

Similar to what is seen with the barriers, most of the facilitators can be related back to the concepts of time and priority. Patient inquiry about CRC screening, risk factor assessments, and algorithms all help the healthcare provider to judge the priority of CRC screening for the patient. On the other hand, having a patient come in for a regular physical examination, familiarity with screening guidelines, and having active reminder systems are strategies that create or save additional time with the patient. Understanding these facilitators can help to develop a process that utilizes the limited amount of time a

healthcare provider has with a patient effectively and efficiently while ensuring consistency and appropriateness of CRC screening recommendations.

The results of this study on the perception of facilitators by healthcare providers confirms what the literature and practitioner guides have put forth previously. However, these same facilitators are continually discussed in the field as they are not fully adopted by all health systems and practitioners or applied consistently enough to make the substantial improvements in CRC screening rates desired. As in the discussion of barriers, communities of practice offer an alternative way to promote, adopt, and implement these best practices at the healthcare provider level to create a fundamental shift in thinking. Affecting how healthcare providers understand and believe in these practices may provide a better way to create effective, widespread, and sustainable change. Going back to the framework of social cognitive theory (SCT), theory of reasoned action (TRA), and theory of planned behavior (TPB), using communities of practice in this way may help to shape the attitudes, beliefs, and perceptions that are critical to forming the critical mass of conditions necessary for inducing the desired action of making CRC screening recommendations.

This procedure of establishing best practices and developing standards should start with bringing together the clinicians within the COP to clearly identify practice needs and gaps, establish goals, evaluate available resources, and devise innovative strategies and tools. Through a formative process, consensus can be built and a strong sense of buy-in created among the members. This experience creates shared knowledge, understanding, and tools which each member has ownership of. It also creates and solidifies a common set of beliefs, attitudes, and perceptions. The members could then

take all this back to their health systems and to other COP, spreading their passion and enthusiasm along the way.

Research Question Three

What effect does a provider having completed a CRC screening test have on providers' perceptions of barriers and facilitators? Personal experience can be a powerful motivator and is an integral part of the framework of SCT, TRA, and TPB (Bandura 1986; Ajzen & Fishbein, 1980). Colorectal cancer screening has the potential to be an intense experience that shapes and influences a person's feelings and attitudes about CRC screening. This research question is based upon the idea that if a healthcare provider had experienced CRC screening his or her self, that may affect the way they perceive the barriers and facilitators related to making CRC screening recommendations. Finding an answer to this question may lead to strategies for leveraging that experience through education and training to improve consistency and quality of CRC screening recommendations.

The tests used to examine whether any relationships existed between the independent variable of having experienced a CRC screening test and the dependent variables of the perceptions of barriers and facilitators did not yield any significant results. While this result was not expected, it is not necessarily a failure of the framework. Rather, it shows the complexity of understanding human decision-making and action. Ajzen (2002) explained that behavioral, normative, and control beliefs all have a role to play in the behavioral outcomes of an individual. The experience of undergoing a CRC screening test may not have a significant impact on healthcare providers' beliefs and attitudes or there may be additional confounders that have

obscured the relationship. In any case, the results give valuable information for future exploration of healthcare provider behavior.

Future studies may want to re-examine the range of experiences which may impact perceptions of barriers and facilitators. There may be factors that are more impactful or that are related in such a way that creates an interaction effect. A multivariate design may help to identify such interactions. Alternatively, a more qualitative approach exploring personal experiences, with respect to healthcare providers' practice of CRC screening, may deepen the understanding of their effect on perceptions and behavior.

Should future research find relationships between specific personal experiences and provider perceptions, the potential practical application of this information may include developing training and education programs that simulate or recreate those experiences to augment perceptions and influence behavior. Practice may be affected by providers developing a better emotional intelligence in relation to CRC screening and allow for more organic and ultimately effective discussion with patients.

While this research question was unable to establish an explanation for healthcare provider perceptions of barriers and facilitators, there are other interesting findings that developed in the analysis of the results for this question. Almost 55 percent of respondents indicated that they had undergone a CRC screening test. Of those, about 55 percent had experienced colonoscopy, about 27 percent had a fecal occult blood test (FOBT), and fewer than five percent had undergone iFOBT/FIT. When asked which tests they most often recommend, respondents cited colonoscopy at about 78 percent, FOBT at 11 percent, and iFOBT/FIT at about four percent.

Respondents were unanimous with a favorable view of colonoscopy's efficacy, they were split 52 percent favorable to 48 percent unfavorable on FOBT, and 74 percent favorable to 26 percent unfavorable on the efficacy of iFOBT/FIT. The results show a clear bias towards colonoscopy as anticipated from the review of the literature (Anhang, Zapka, Edwards, & Taplin, 2010; Zapka et al., 2012). These results also suggest that the healthcare providers in this sample are confused or unfamiliar with the difference between the older FOBT and the newer and more accurate iFOBT/FIT. It may also suggest that the respondents are not fully aware of the most current CRC screening guidelines that recommend the use of iFOBT/FIT over FOBT. Additionally, there appears to be other unknown factors that are causing providers to both choose for themselves and recommend to patients FOBT more often than iFOBT/FIT even though there is a clear bias toward iFOBT/FIT in the perception of efficacy.

These ancillary results may provide some explanation as to the failure to find statistical significance. Further study to examine healthcare providers' understanding of CRC screening tests and the recommended CRC screening guidelines may provide a better basis for developing a comprehension of how the interaction of experience, attitudes, and beliefs affects perceptions of barriers and facilitators to making CRC screening recommendations.

Research Question Four

Can a healthcare provider's attitude on the efficacy of the different CRC screening tests predict their perceptions of barriers and facilitators? To answer this question, an examination of the relationship between the favorability of colonoscopy, FOBT, and iFOBT/FIT and the perceptions of barriers and facilitators was conducted

using linear regression. Statistical significance was found between the independent variable of the attitude on the favorability of iFOBT/FIT and the constructs of systems barriers, healthcare provider facilitators, and systems facilitators.

In examining the r-squared values, the amount of variation that is explained by this relationship is relatively small; not unusual for something as complex as human behavior (Glanz & Slinker, 2001). Nonetheless, the existence of this relationship provides insight and fresh considerations for discussion. Future research may make use of mixed methods by identifying correlations between attitudes and perceptions through quantitative means and then exploring those relationships with interviews or focus groups to understand the depth and dimensionality of those factors, their interactions, and their repercussions on behavior. This approach may yield a more complete picture of how each component from the SCT model manifests in this context.

As previously discussed, there have been unexpected results related to iFOBT/FIT from some of the ancillary questions from the survey. It is curious to find that in the testing performed, it was the independent variable related to the efficacy of iFOBT/FIT that produced any significant results. About three quarters of respondents had a favorable view of the efficacy of iFOBT/FIT. Looking at the theoretical framework, theory of reasoned action (TRA) states that the belief that performing a specific action will lead to a specific outcome is the basis for forming behavioral intentions (Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975). It appears that belief among healthcare providers on the ability of iFOBT/FIT to produce a reliable result is high and that belief in turn affects the way they perceive barriers and facilitators at certain levels.

The results also leave the question as to why is there significance with some of the constructs and not others. Again, going back to the theoretical framework, there are several factors that interact to construct the attitudes, beliefs, and intentions that produce a specific action (Ajzen & Fishbein, 1980; Bandura, 1986; Bandura, 1998; Fishbein & Ajzen, 1975). One of these factors is control beliefs that relate to the barriers and facilitators related to an action (Ajzen, 2001; Montaña & Kasprzyk, 2008). A difference in the perception of control over the different barriers and facilitators may be a reason why there were significant results for some of the constructs and not for others; however, identifying an exact cause for the difference in results would require additional study.

There were no significant results for the independent variable related to the efficacy of the traditional FOBT. The perception of the efficacy of FOBT was mixed with a nearly even split among respondents. With such a close division, it would be difficult to argue that there is a strong opinion overall one way or another. If it is true the respondents' efficacy beliefs about FOBT are tepid, that would explain why this variable did not show an influence on respondents' perception of barrier and facilitators.

Implications for Practice

There are several implications for practice and recommendations that can be made from the results. The first of which is that by understanding the barriers and facilitators that affect the healthcare providers in North Dakota, strategies can be developed and implemented that reduce barriers and promote effective facilitators. Fortunately, there are evidence-based strategies and toolkits in existence that can be adopted at the health system level that address some of the barriers and facilitators covered in this study. Statewide public health programs can utilize the study results and identify key strategies

that can be implemented statewide across facilities. Statewide coordination of strategy can help to align priorities and open dialog for systemic change.

This study also uncovered evidence that there is some confusion related to iFOBT/FIT and traditional FOBT. The United States Preventative Services Task Force recommends iFOBT/FIT over traditional FOBT as a high-quality test, yet the respondents in this study chose traditional FOBT for themselves much more often than iFOBT/FIT. There were also mixed attitudes about efficacy of traditional FOBT. This presents an opportunity for education about the screening guidelines and the different CRC screening tests. Familiarity with the screening guidelines was cited as a facilitator by over 95 percent of respondents. Implementing an educational campaign addressing this appears to be not only logical, but imperative. In terms of difficulty in implementation, this type of education should have a high level of support by healthcare providers as well as the systems in which they work. There are already several educational tools that are available for use that can be quickly adapted for the facilities in North Dakota.

This study uncovered a theme of competing priorities. As discussed earlier, restructuring the typical office visit to place an emphasis on education and learning could work to change patient attitudes and beliefs, increase engagement, and cultivate a proactive mindset. Once patients take ownership of their health and health-related behaviors, primary care providers can transition from being mostly reactionary — responding to preventable illness — to supporting a proactive, healthful lifestyle for their patients. This approach is in-line with the model of preventive medicine. In practice, an introduction of health-education standards that requires patients to engage with their

healthcare experience on more than just a superficial level would be controversial, but would go towards creating a new patient-provider dynamic.

Perhaps the most important of implications for this study, is the use of communities of practice to change and influence attitudes and behaviors across the field. The North Dakota Colorectal Cancer Roundtable (NDCCRT) is an extension of the National Colorectal Cancer Roundtable (NCCRT) and serves as an active community of practice for the state. This group has been working on utilizing evidence-based strategies to further the goal of increased CRC screening in ND. One shortcoming with this community of practice is that it does not reach all or even the majority of the healthcare providers who should be engaged. The group was founded by and caters to those who have a passion for colorectal cancer care; however, most of the members of this community are not primary care providers who are the most likely to be in a position to make timely recommendations. Rather, the healthcare providers in the group are largely in gastroenterology and oncology. To have the desired impact, the reach of this community needs to be broadened to include the essential stakeholders that have the most reach and influence.

Another important way to better utilize the NDCCRT, NDCC, and other related COP, is to help each organization understand their status as a COP and the benefits and advantages of this type of community. These COP operate largely unaware of the larger purpose of this type of community which is to create shared knowledge, skills, tools, and documents. For most, being a member is about getting information and having opportunities to network. Bringing forth this realization of purpose to each group would allow the work they do to be more intentional. This would bring a focus that helps to

better realize educational goals and the goals of changing beliefs and attitudes to influence change in personal practice.

One of the advantageous aspects of healthcare is that there exists many formal and informal communities of practice. While the NDCCRT has a limited reach, the members of this community invariably participate in others. Reach can be extended by leveraging opportunities that cross over to other communities of practice. The NDCCRT should be intentional in targeting other COP with a viral, grassroots campaign to spread the ideas, knowledge, protocols, and tools that they have developed. Being mindful of other group's priorities, needs, and membership demographics will allow for choosing the right opportunities to get involved in collaborative activities with other influential groups. Once a relationship is established, continuing with the process of shared creation of knowledge and learning should help to transfer the beliefs, attitudes, and perceptions that are integral to influencing the desired screening recommendation behaviors.

One COP that should be targeted is the North Dakota Medical Association (NDMA). The NDMA carries a large amount of influence, has reach across the state to providers in every specialty area, and is considered to be a driving force in the medical community of North Dakota. By engaging this community and working together on making CRC screening a priority, information and tools can be disseminated on a statewide scale with authority. New community driven standards for engaging patients about CRC screening can be promoted and adopted in a way that fosters a high-level of buy-in from healthcare providers across the state.

Conclusion

This study has been about understanding the barriers and facilitators that healthcare providers experience when making recommendations to patients about colorectal cancer screening. With CRC being so prevalent, this research is important because people's lives depend on getting the best medical care possible. Timely and appropriate CRC screening can not only detect cancer, but also prevent it. Anyone who has had an experience with cancer knows how devastating a cancer diagnosis is to the patient and the patient's family and friends. The current study and future research on this topic will contribute to decreasing incidence and mortality of this disease and help keep our loved ones healthy.

With the information from this study, the task at hand is how to use it to benefit both patients and providers. Ultimately, we want to affect the actions and behaviors of our healthcare providers such that they are making the best CRC recommendations and so that patients are following through on that advice and getting screened. While health education and health behavior are complex processes, utilizing communities of practice opens opportunities to further develop solutions for the issues discussed in this study. Creating a movement through shared knowledge, understanding, and practice has a chance to effect sustainable change and complement policy, systems, and environmental change strategies.

APPENDIX

APPENDIX
Survey Form

1. Age <input type="checkbox"/> Under 40 <input type="checkbox"/> 40-49 <input type="checkbox"/> 50-59 <input type="checkbox"/> 60+	2. Sex <input type="checkbox"/> Male <input type="checkbox"/> Female
3. Which of the following best describes your training? <input type="checkbox"/> Physician <input type="checkbox"/> Physician's Assistant <input type="checkbox"/> Nurse Practitioner <input type="checkbox"/> Other: _____	4. How many years have you practiced since finishing your training? <input type="checkbox"/> Less than 5 years <input type="checkbox"/> 5-10 years <input type="checkbox"/> 10-15 years <input type="checkbox"/> 15-20 years <input type="checkbox"/> More than 20 years
5. Specialty <input type="checkbox"/> Family Practice <input type="checkbox"/> General Practice <input type="checkbox"/> Internal Medicine <input type="checkbox"/> Other: _____	6. Do you perform, order, or refer patients for colorectal cancer screening? <input type="checkbox"/> Yes <input type="checkbox"/> No

7a. Have you personally undergone screening for colorectal cancer?	<input type="checkbox"/> Yes <input type="checkbox"/> No
7b. If you answered "Yes" to 6a above, which colorectal cancer screening test(s) have you had? (Check all that apply)	<input type="checkbox"/> Colonoscopy <input type="checkbox"/> Fecal Occult Blood Test <input type="checkbox"/> Flexible Sigmoidoscopy <input type="checkbox"/> Other: _____
8. Do you have personal experience with a family member or patient who has had colorectal cancer?	<input type="checkbox"/> Yes <input type="checkbox"/> No
9. Which colorectal cancer screening test do you most often recommend for average-risk patients?	<input type="checkbox"/> Colonoscopy <input type="checkbox"/> Fecal Occult Blood Test (FOBT) <input type="checkbox"/> iFOBT/FIT <input type="checkbox"/> Flexible Sigmoidoscopy <input type="checkbox"/> Other: _____
10. How often do you present more than one test option when discussing colorectal cancer screening?	<input type="checkbox"/> Never <input type="checkbox"/> Rarely <input type="checkbox"/> Sometimes <input type="checkbox"/> Usually
11. How would you describe your attitude toward recommending colorectal cancer screening tests to patients?	<input type="checkbox"/> Positive <input type="checkbox"/> Neutral <input type="checkbox"/> Negative
12. How would you describe your opinion on the efficacy of colonoscopy?	<input type="checkbox"/> Favorable <input type="checkbox"/> Unfavorable
13. How would you describe your opinion on the efficacy of fecal occult blood test (FOBT)?	<input type="checkbox"/> Favorable <input type="checkbox"/> Unfavorable

14. How would you describe your opinion on the efficacy of immunochemical fecal occult blood test (iFOBT) or fecal immunochemical test (FIT)?	<input type="checkbox"/> Favorable <input type="checkbox"/> Unfavorable
------------------------------------------------------------------------------------------------------------------------------------------------------	----------------------------------------------------------------------------

For the following sections, please rate the degree to which you agree with each statement by circling the number. 1=Strongly Disagree, 2=Disagree, 3=Slightly Disagree, 4=Slightly Agree, 5=Agree, 6=Strongly Agree

Patient Barriers

15. The presence of patient comorbidities has caused me to defer or miss discussion of colorectal cancer screening during patient visits.	1 2 3 4 5 6
16. A patient's previous refusal to comply with screening recommendations has caused me to defer or miss discussion of colorectal cancer screening during patient visits.	1 2 3 4 5 6
17. Having a patient that is "distrusting" or "anti-medicine" has caused me to defer or miss discussion of colorectal cancer screening during patient visits.	1 2 3 4 5 6
18. A patient who is not up-to-date with other cancer screening (e.g. mammography, prostate screening test) has caused me to defer or miss discussion of colorectal cancer screening during patient visits.	1 2 3 4 5 6

Physician Barriers

19. Concurrent care provided by a gastroenterologist or other specialist has caused me to defer or miss discussion of colorectal cancer screening with patients.	1 2 3 4 5 6
20. I sometimes forget to discuss colorectal cancer screening with patients.	1 2 3 4 5 6
21. If a patient is scheduled for a full examination at a future visit, I may defer discussion of colorectal cancer screening.	1 2 3 4 5 6
22. Being tired or fatigued has caused me to defer or miss discussion of colorectal cancer screening with patients.	1 2 3 4 5 6

Systems Barriers

23. It is challenging to recommend colorectal cancer screening during an acute care visit and may cause me to defer or miss discussion of colorectal cancer screening with patients.	1 2 3 4 5 6
24. Limited time during patient visits has caused me to defer or miss discussion of colorectal cancer screening with patients.	1 2 3 4 5 6
25. A lack of reminder systems has caused me to defer or miss discussion of colorectal cancer screening with patients.	1 2 3 4 5 6
26. Inability to track down prior dates of screening has caused me to defer or miss discussion of colorectal cancer screening with patients.	1 2 3 4 5 6
27. Awareness of a patient's insurance status has caused me to defer or miss discussion of colorectal cancer screening with patients.	1 2 3 4 5 6

Patient Facilitators

28. I am more likely to discuss or recommend a colorectal cancer screening test if the patient inquires about it or makes a request.	1	2	3	4	5	6
29. I am more likely to discuss or recommend a colorectal cancer screening test if the patient is aged 50-59 than those aged 60 or older.	1	2	3	4	5	6
30. I am more likely to discuss or recommend a colorectal cancer screening test if the patient is healthy or medically stable.	1	2	3	4	5	6
31. I am more likely to discuss or recommend a colorectal cancer screening test if the patient has a history of cancer.	1	2	3	4	5	6
32. I am more likely to discuss or recommend colorectal cancer screening if the patient is a woman.	1	2	3	4	5	6
33. I am more likely to discuss or recommend a colorectal cancer screening test if the patient is anxious or the “worrying type”.	1	2	3	4	5	6

Physician Facilitators

34. I am more likely to discuss or recommend a colorectal cancer screening test when I have time to review the patient’s chart before or during the encounter.	1	2	3	4	5	6
35. I am more likely to discuss or recommend a colorectal cancer screening test when I use an algorithm or routine checklist for screening when with a patient.	1	2	3	4	5	6
36. Familiarity with colorectal cancer screening guidelines helps me to discuss or recommend colorectal cancer screening tests.	1	2	3	4	5	6

Systems Facilitators

37. I am more likely to discuss or recommend a colorectal cancer screening test when I see a patient for an annual physical.	1	2	3	4	5	6
38. I am more likely to discuss or recommend a colorectal cancer screening test when there is a reminder (e.g. flow sheet, survey, electronic reminder, etc.)	1	2	3	4	5	6
39. I am more likely to discuss or recommend a colorectal cancer screening test if there is a FOBT/iFOBT/FIT kit available in the exam room.	1	2	3	4	5	6
40. I am more likely to discuss or recommend a colorectal cancer screening test when there are incentives available from insurers.	1	2	3	4	5	6
41. I am more likely to discuss or recommend a colorectal cancer screening test when teaching residents.	1	2	3	4	5	6
42. I am more likely to discuss or recommend a colorectal cancer screening test if the patient is being scheduled for another procedure such as an upper endoscopy.	1	2	3	4	5	6
43. I am more likely to discuss or recommend a colorectal cancer screening test when there is a public education campaign currently running.	1	2	3	4	5	6
44. I am more likely to discuss or recommend a colorectal cancer screening test if a patient risk factor assessment has been completed.	1	2	3	4	5	6

REFERENCES

- Ajzen, I. (1991). The theory of planned behavior. *Organizational behavior and human decision processes*, 50(2), 179-211.
- Ajzen, I., & Fishbein, M. (1980). *Understanding attitudes and predicting social behaviour*. Englewood Cliffs, NJ: Prentice-Hall.
- Ajzen, I. (2001). Attitudes. *Annual Review of Psychology*, 52, 27-58.
- Ajzen, I. (2002). Perceived behavioral control, self-efficacy, locus of control, and the theory of planned behavior. *Journal of Applied Social Psychology*, 32(4), 665-683.
- Ajzen, I. & Fishbein, M. (1980). *Understanding attitudes and predicting social behavior*. Englewood Cliffs, NJ: Prentice-Hall.
- Ajzen, I. & Fishbein, M. (2005). The influence of attitudes on behavior. In D. Albarracin, B.T. Johnson, & M.P. Zanna (Eds.), *The handbook of attitudes* (173-221). Mahwah, NJ: Lawrence Erlbaum Associates.
- Ajzen, I., & Madden, T. J. (1986). Prediction of goal-directed behavior: Attitudes, intentions, and perceived behavioral control. *Journal of Experimental Social Psychology*, 22, 453-474.
- American Cancer Society (ACS). (2016). *Colorectal cancer facts & figures 2014-2016*. Atlanta: Author.

- Anhang Price, R., Zapka, J., Edwards, H., & Taplin, S.H. (2010). Organizational factors and the cancer screening process. *Journal of the National Cancer Institute*, 2010(40), 38-57.
- Arora, N.K. (2003). Interacting with cancer patients: The significance of physicians' communication behavior. *Social Science & Medicine*, 57(5), 791-806.
- Bandura, A. (1969). *Principles of behavior modification*. New York: Holt, Rinehart, & Winston.
- Bandura, A. (1977). Self-efficacy: toward a unifying theory of behavioral change. *Psychological review*, 84(2), 191.
- Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Englewood Cliffs, NJ: Prentice-Hall
- Bandura, A. (1989). Human agency in social cognitive theory. *American Psychologist*, 44(9), 1175-1184.
- Bandura, A. (1991). Self-regulation of motivation through anticipatory and self-regulatory mechanisms. In R.A. Dienstbier (Ed.), *Perspectives On Motivation: Nebraska Symposium On Motivation* (Vol. 38, pp. 69-164). Lincoln, NE: University of Nebraska Press.
- Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York: Freeman.
- Bandura, A. (1998). Health promotion from the perspective of social cognitive theory. *Psychology and Health*, 13, 623-649.
- Bandura, A. (2001). Social Cognitive Theory: An agentic perspective. *Annual Review of Psychology*, 52, 1-26.

- Bandura, A., & Adams, N.E. (1977). An analysis of self-efficacy theory of behavior change. *Cognitive Therapy and Research, 1*, 125-139.
- Bandura, A., Adams, N. E., Hardy, A. B., & Howells, G. N. (1980). Tests of the generality of self-efficacy theory. *Cognitive therapy and research, 4*(1), 39-66.
- Becker, M. H. (1974). The health belief model and personal health behavior. *Health Education Monographs, 2*, 324-473.
- Becker, C., Kraft, J. M., Southwell, B. G., & Jorgensen, C. M. (2000). Colorectal cancer screening in older men and women: qualitative research findings and implications for intervention. *Journal of community health, 25*(3), 263-278.
- Berkowitz, Z.B., Hawkins, N.A., Peipins, L.A., White, M.C., & Nadel, M.R. (2008). Beliefs, risk perceptions, and gaps in knowledge as barriers to colorectal cancer screening in older adults. *Journal of the American Geriatrics Society, 56*, 307-314.
- Braddock, C.H., Fihn, S.D., Levinson, W., Jonsen, A.R., & Pearlman, R.A. (1997). How doctors and patients discuss routine clinical decisions: Informed decision making in the outpatient setting. *Journal of General Internal Medicine, 12*(6), 339-345.
DOI: 10.1007/s11606-006-5081-x
- Braddock, C.H., Edwards, K.A., Hasenberg, N.M., Laidley, T.L., & Levinson, W. (1999). Informed decision making in outpatient practice: Time to get back to basics. *Journal of the American Medical Association, 282*(24), 2313-2320.

- Burack, R. C., Gimotty, P. A., George, J., Stengle, W., Warbasse, L., & Moncrease, A. (1994). Promoting screening mammography in inner-city settings: a randomized controlled trial of computerized reminders as a component of a program to facilitate mammography. *Medical care*, 32(6), 609-624.
- Cabana, M.D., Rand, C.S., Powe, N.R., Wu, A.W., Wilson, M.H., Abboud, P.C., ... & Rubin, H.R. (1999). Why don't physicians follow clinical practice guidelines? A framework for improvement. *Journal of the American Medical Association*, 282, 1458-1465.
- Cacioppo, J.T., Andersen, B.L., Turnquist, D.C., & Tassinary, L.G. (1989). Psychophysiological comparison theory: On the experience description, and assessment of signs and symptoms. *Patient Education and Counseling*, 13, 257-270.
- Champion, V.L. & Skinner, C.S. (2008). The health belief model. In K. Glanz, B.K. Rimer, & K. Viswanath (Eds.), *Health behavior and health education: Theory, research, and practice* (45-65). San Francisco: Jossey-Bass.
- Clavarino, A. M., Janda, M., Hughes, K. L., Del Mar, C., Tong, S., Stanton, W. R., ... & Newman, B. (2004). The view from two sides: a qualitative study of community and medical perspectives on screening for colorectal cancer using FOBT. *Preventive medicine*, 39(3), 482-490.
- Clover, K., Redman, S., Forbes, J., Sanson-Fisher, R., & Callaghan, T. (1996). Two sequential randomized trials of community participation to recruit women for mammographic screening. *Preventive medicine*, 25(2), 126-134.

- Creswell, J.W. (2013). *Qualitative inquiry and research design: Choosing among five approaches*. Los Angeles: SAGE Publications.
- Cronbach, L.J. & Meehl, P.E. (1955). Construct validity in psychological tests. *Psychological Bulletin*, 52(4), 281-302.
- deVries, H., & Backbier, M. P. H. (1994). Self-efficacy as an important determinant of quitting among pregnant women who smoke: The Ø-pattern. *Preventive Medicine*, 23, 167-174.
- deVries, H., Dijkstra, M., & Kuhlman, P. (1988). Self-efficacy: The third factor besides attitude and subjective norm as a predictor of behavioural intentions. *Health Education Research*, 3, 273-282.
- DiClemente, R.J., Crosby, R.A., & Kegler, M.C. (Eds.). (2002). *Emerging theories in health promotion practice and research: Strategies for improving the public health*. San Francisco, CA: Jossey-Bass.
- Dickey, L.L. & Kamerow, D.B. (1996). Primary care physicians' use of office resources in the provision of preventative care. *Archives of Family Medicine*, 5, 399-404.
- Dzewaltowski, D. A., Noble, J. M., & Shaw, J. M. (1990). Physical activity participation: Social cognitive theory versus the theories of reasoned action and planned behavior. *Journal of Sport and Exercise Psychology*, 12, 388-405.
- Edwards, A., & Elwyn, G. (1999). How should effectiveness of risk communication to aid parents decisions be judged?: A review of the literature. *Medical Decision Making*, 19, 428-434.

- Ellerbeck, E.F., Engelman, K.K., Gladden, J., Mosier, M.C., Raju, G.S., & Ahluwalia, J.S. (2001). Direct observation of counseling on colorectal cancer in rural primary care practices. *Journal of General Internal Medicine, 16*, 697-700.
- Elmunzer, B.J., Singal, A.G., Sussman, J.B., Deshpande, A.R., Sussman, D.A., Conte, M.L., ...& Waljee, A.K. (2015). Comparing the effectiveness of competing tests for reducing colorectal cancer mortality: A network meta-analysis. *Gastrointestinal Endoscopy, 81*(3), 700-709.
- Epstein, R.M., & Street, R.L. (2007). Patient-centered communication in cancer care: Promoting healing and reducing suffering. *NIH Publication No. 07-6225*. Bethesda, MD: National Cancer Institute.
- Fishbein, M. (ed.). (1967). *Readings in attitude theory and measurement*. New York, NY: Wiley.
- Fishbein, M. (2009). An integrative model for behavioral prediction and its application to health promotion. In R.J. DiClemente, R.A. Crosby, and M.C. Kegler (Eds.), *Emerging theories in health promotion practice and research* (pp. 215-234). San Francisco, CA: Jossey-Bass.
- Fishbein, M. and Ajzen, I. (1975). *Belief, attitude, intention, and behavior: An introduction to theory and research*. Reading, MA: Addison-Wesley.
- Glanz, K., & Rimer, B.K. (1995). *Theory at a glance: A guide to health promotion and practice*. Bethesda, MD: National Cancer Institute.
- Glanz, K., Rimer, B.K., & Viswanath, K. (Eds.). (2008). *Health behavior and health education: Theory, research, and practice*. San Francisco, CA: Jossey-Bass.

- Glanz, S.A. & Slinker, B.K. (2001). *Primer of applied regression and analysis of variance*. New York: McGraw Hill.
- Godin, G., Kok, G. (1996). The theory of planned behavior: A review of its applications to health-related behaviors. *American Journal of Health Promotion, 11*(2), 87-98.
- Greco, P.J., & Eisenberg, J.M. (1993). Changing physicians' practices. *New England Journal of Medicine, 329*, 1271-1274.
- Grimshaw, J.M., Eccles, M.P., Waler, A.E., & Thomas, A.E. (2002). Changing physicians' behavior: What works and thoughts on getting more things to work. *Journal of Continuing Education Health Professionals, 22*, 237-243.
- Guerra, C. E., Dominguez, F., & Shea, J. A. (2005). Literacy and knowledge, attitudes, and behavior about colorectal cancer screening. *Journal of health communication, 10*(7), 651-663.
- Guerra, C.E., Schwartz, J.S., Armstrong, K., Brown, J.S., Halbert, C.H., & Shea, J.A. (2007). Barriers of and facilitators to physician recommendation of colorectal cancer screening. *Journal of General Internal Medicine, 22*(12), 1681-1688.
- Holden, D.J., Jonas, D.E., Porterfield, D.S., Reuland, D., & Harris, R. (2010). Systematic review: Enhancing the use and quality of colorectal cancer screening. *Annals of Internal Medicine, 152*, 668-676.
- Holt, W. S. (1991). Factors affecting compliance with screening sigmoidoscopy. *The Journal of family practice, 32*(6), 585-589.

- Honeycutt, S., Leeman, J., McCarthy, W.J., Bastani, R., Carter-Edwards, L., Clark, H., ... & Kegler, M. (2015). Evaluating policy, systems, and environmental change interventions: Lessons learned from CDC's Prevention Research Centers. *Preventing Chronic Disease, 12*(174).
- Howlander, N., Noone, A.M., Krapcho, M., Miller, D., Bishop, K., Altekruse, S.F., ... & Cronin, K.A. (2016). SEER cancer statistics review, 1975-2013. Bethesda, MD: National Cancer Institute.
- Ioannou, G. N., Chapko, M. K., & Dominitz, J. A. (2003). Predictors of colorectal cancer screening participation in the United States. *The American journal of gastroenterology, 98*(9), 2082-2091.
- Jacob, B.J., Moineddin, R., Sutradhar, R., Baxter, N.N., & Urbach, D.R. (2012). Effect of colonoscopy on colorectal cancer incidence and mortality: An instrumental variable analysis. *Gastrointestinal Endoscopy, 76*(2), 355-364.
<http://dx.doi.org/10.1016/j.gie.2012.03.247>
- Jones, R. M., Devers, K. J., Kuzel, A. J., & Woolf, S. H. (2010). Patient-reported barriers to colorectal cancer screening: a mixed-methods analysis. *American journal of preventive medicine, 38*(5), 508-516.
- Kanfer, F.H. (1977). The many faces of self-control, or behavior modification changes its focus. In R.B. Stuart (Ed.), *Behavioral self-management: Strategies, techniques, and outcomes*. New York: Brunner/Mazel.
- Klabunde, C.N., Frame, P.S., Meadow, A., Jones, E., Nadel, M., & Vernon, S.W. (2003). A national survey of primary care physicians' colorectal cancer screening recommendations and practices. *Preventive Medicine, 36*, 352-362.

- Klabunde, C.N., Lanier, D., Breslau, E.S., Zapka, J.G., Fletcher, R.H., Ransohoff, D.F., & Winawer, S.J. (2007). Improving colorectal cancer screening in primary care practice: Innovative strategies and future directions. *Journal of General Internal Medicine, 22*, 1195-1205.
- Klabunde, C.N., Vernon, S.W., Nadel, M.R., Breen, N., Seeff, L.C., & Brown, M.L. (2005). Barriers to colorectal cancer screening: A comparison of reports from primary care physicians and average-risk adults. *Medical Care, 43*(9), 939-944.
- Kok, G., deVries, H., Mudde, A. N., & Strecher, V. J. (1991). Planned health education and the role of self-efficacy: Dutch research. *Health Education Research, 6*, 231-238.
- Lafata, J.E., Cooper, G.S., Divine, G., Flocke, S.A., Oja-Tebbe, N., Stange, K.C., ...& Wunderlich, T. (2011). Patient-physician colorectal cancer screening discussions: Delivery of the 5A's in practice. *American Journal of Preventative Medicine, 41*(5), 480-486.
- Lantz, P.M., Stencil, D., Lippert, M.T., Beversdorf, S., Jaros, L., & Remington, P.L. (1995). Breast and cervical cancer screening in a low-income managed care sample: The efficacy of physician letters and phone calls. *American Journal of Public Health, 85*, 834-836.
- Lave, J. (1987). A comparative approach to educational forms and learning processes. *Anthropology and Education Quarterly, 13*(2), 181-187.
- Lave, J. (1988). *Cognition in practice: Mind, mathematics and culture in everyday life*. New York, NY: Cambridge University Press.

- Lave, J. (1991). Situating learning in communities of practice. *Perspectives on socially shared cognition*, 2, 63-82.
- Lave, J. & Chaiklin, S. (Eds.). (1993). *Understanding practice: Perspectives on activity and context*. Cambridge, UK: University of Cambridge Press.
- Lave, J. & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. Cambridge, UK: University of Cambridge Press.
- Lemon, S.C., Zapka, J.G., Estabrook, B., Erban, S., & Luckmann, R. (2003). Screening for colorectal cancer on the front line. *American Journal of Gastroenterology*, 98(4), 915-923.
- Leventhal, H., Leventhal, E.A., & Contrada, R.J. (2007). Self-regulation, health, and behavior: A perceptual cognitive approach. *Psychology and Health*, 13, 717-733.
- Levinsky, N. (1996). Social, institutional, and economic barriers to the exercise of patients' rights. *New England Journal of Medicine*, 334(8), 532-534.
- Lewis, S. F., & Jensen, N. M. (1996). Screening sigmoidoscopy. *Journal of general internal medicine*, 11(9), 542-544.
- Li, L.C., Grimshaw, J.M., Nielsen, C., Judd, M., Coyte, P.C., & Graham, I.D. (2009). Use of communities of practice in business and healthcare sectors: A systematic review. *Implementation Science*, 4(27).
- Ling, B.S., Trauth, J.M., Fine, M.J., Mor, M.K., Resnick, A., Braddock, C.H., ... & Whittle, J. (2008). Informed decision-making and colorectal cancer screening: Is it occurring in primary care?. *Medical Care*, 46(9), 23-27.

- Lipsey, M.W. (2005). The challenges of interpreting research for use by practitioners: Comments on the latest products from the Task Force on Community Preventive Services. *American Journal of Preventative Medicine*, 28(2), 1-3.
- Madden, M. J., Ellen, P. S., Ajzen, I. (1992). A comparison of the theory of planned behavior and the theory of reasoned action. *Personality and Social Psychology Bulletin*, 18(1), 3-9.
- McAlister, A.L., Perry, C.L., & Parcel, G.S. (2008). How individuals, environments, and health behaviors interact: Social cognitive theory. In K. Glanz, B.K. Rimer, & K. Viswanath (Eds.), *Health behavior and health education: Theory, research, and practice* (169-188). San Francisco: Jossey-Bass.
- McGregor, S.E., Hilsden, R.J., Murray, A., & Bryant, H.E. (2004). Colorectal cancer screening: Practices and opinions of primary care physicians. *Preventative Medicine*, 39(2), 279-285.
- McKinlay, J.B. & Marceau, L.D. (2000). Upstream health public policy: Lessons from the battle of tobacco. *International Journal of Health Services*, 30(1), 49-69.
- McLeroy, K.R., Bibeau, D., Steckler, A., & Glanz, K. (1988). An ecological perspective on health promotion programs. *Health Education Quarterly*, 15, 351-377.
- Meissner, H.I., Klabunde, C.N., Breen, N., Zapka, J.M. (2012). Breast and colorectal cancer screening: U.S. primary care physician's reports of barriers. *American Journal of Preventative Medicine*, 43(6), 584-589.

- Montaño, D.E., Kasprzyk, D. (2008). Theory of reasoned action, theory of planned behavior, and the integrated behavioral model. In K. Glanz, B.K. Rimer, & K. Viswanath (Eds.), *Health behavior and health education: Theory, research, and practice* (67-96). San Francisco: Jossey-Bass.
- Myers, R.E., Trock, B.J., Lerman, C., Wolf, T., Ross, E., & Engstrom, P.F. (1990). Adherence to colorectal cancer screening in an HMO population. *Preventive Medicine, 19*(5), 502-514.
- Myers, R. E., Turner, B., Weinberg, D., Hyslop, T., Hauck, W. W., Brigham, T., ... & Schlackman, N. (2004). Impact of a physician-oriented intervention on follow-up in colorectal cancer screening. *Preventive medicine, 38*(4), 375-381.
- National Cancer Institute (2016). PDQ colorectal cancer screening. Bethesda, MD: Author.
- National Task Force on the Preparation and Practice of Health Educators, Inc. (1985). *A framework for the development of competency-based curricula*. New York, NY: National Task Force, Inc.
- Noar, S.M., and Zimmerman, R.S. (2005). Health behavior theory and cumulative knowledge regarding health behaviors: Are we moving in the right direction. *Health Education Research, 20*(3), 275-290.
- Nodora, J.N., Martz, W.D., Ashbeck, E.L., Jacobs, E.T., Thompson, P.A., & Martinez, M.E. (2011). Primary care physician compliance with colorectal cancer screening guidelines. *Cancer Causes and Control, 22*, 1277-1287.
- North Dakota Behavioral Risk Factor Surveillance System (ND BRFSS). (2015). 2014 Core variable report. Bismarck, ND: North Dakota Department of Health.

- Parboosingh, J.T. (2002). Physician communities of practice: Where learning and practice are inseparable. *Journal of Continuing Education in the Health Professions*, 22, 230-236.
- Philips, G.K., Reinier, K., Ashikaga, T., & Luebbers, R.A. (2005). Attitudes and beliefs of primary care physicians regarding prostate and colorectal cancer screening in a rural state. *Journal of Cancer Education*, 20(3), 167-172.
- Price, R. A., Zapka, J., Edwards, H., & Taplin, S. H. (2010). Organizational factors and the cancer screening process. *Journal of the National Cancer Institute. Monographs*, 2010(40), 38.
- Prochaska, J.O. & DiClemente, C.C. (1983). Stages and processes of self-change of smoking: Toward an integrative model of change. *Journal of Consulting and Clinical Psychology*, 51, 390-395.
- Purvis Cooper, C., Merritt, T.L., Ross, L.E., John, L.V., & Jorgensen, C.M. (2004). To screen or not to screen, when clinical guidelines disagree: Primary care physicians' use of the PSA test. *Preventative Medicine*, 38(2), 182-191.
- Randolph, W., & Viswanath, K. (2004). Lessons from mass media public health campaigns. *Annual Review of Public Health*, 25, 419-437.
- Ransohoff, J.F. (2009). How much does colonoscopy reduce colon cancer mortality?. *Annals of Internal Medicine*, 150(1), 50-52.
- Rimer, B.K., Glanz, K., and Rasband, G. (2001). Searching for evidence about health education and health behavior interventions. *Health Education and Behavior*, 28, 231-248.

- Robertson, N., Baker, R., & Hearnshaw, H. (1996). Changing the clinical behavior of doctors: A psychological framework. *Quality Health Care*, 5, 51-54.
- Rosenstock, I.M., Strecher, V.J., & Becker, M.H. (1988). Social learning theory and the health belief model. *Health Education Quarterly*, 15(2), 175-183.
- Ruffin, M.T., Gorenflo, D.W., & Woodman, B. (2000). Predictors of screening for breast, cervical, colorectal, and prostatic cancer among community-based primary care practices. *Journal of the American Board of Family Practice*, 13(1), 1-10.
- Sarfaty, M. & Wender, R. (2007). How to increase colorectal cancer screening rates in practice: A primary care clinician's evidence-based toolbox and guide. Atlanta, GA: American Cancer Society.
- Schroy, P.C., Emmons, K., Peters, E., Pignone, M., Glick, J., Robinson, P., ...& Heeren, T. (2011). Shared decision-making for colorectal cancer screening increases adherence. *Gastroenterology*, 140(5), 404.
- Schwarzer, R. (1992). Self-efficacy in the adoption and maintenance of health behaviors: Theoretical approaches and a new model. In R. Schwarzer (Ed.), *Self-Efficacy: Thought Control of Action* (pp. 217-243). Washington, D.C.: Hemisphere.
- Seeff, L.C., Nadel, M.R., Klabunde, C.N., Thompson, T., Shapiro, J.A., Vernon, S.W., & Coates, R.J. (2004). Patterns and predictors of colorectal cancer test use in the adult U.S. population. *Cancer*, 100(10), 2093-2103.
- Shokar, N. K., Carlson, C. A., & Shokar, G. S. (2006). Physician and patient influences on the rate of colorectal cancer screening in a primary care clinic. *Journal of Cancer Education*, 21(2), 84-88.

- Smith, M.K. (2009). Jean Lave, Etienne Wenger and communities of practice. In *The Encyclopedia of Informal Education*. Retrieved from www.infed.org/biblio/communities_of_practice.htm
- Sox, C.H., Dietrich, A.J., Tosteson, T.D., Winchell, C.W., & Labaree, C.E. (1997). Periodic health examinations and the provision of cancer prevention services. *Archives of Family Medicine*, 6, 223-230.
- Steinwachs, D., Allen, J.D., Barlow, W.E., Duncan, R.P., Egede, L.E., Friedman, L.S., ... & Virniq, B.A. (2010). Proceedings from the National Institutes of Health state-of-the-science conference: Enhancing use and quality of colorectal screening. Bethesda, MD: National Institutes of Health.
- Stokols, D., Grzywacz, J.G., McMahan, S., & Philips, K. (2003). Increasing the health promotive capacity of human environments. *American Journal of Health Promotion*, 18(1), 4-13.
- Tran, J.L., Saylor, J. & Askew, D. (2013). 2013 North Dakota Burden of Cancer Report. Bismarck, ND: North Dakota Department of Health.
- United States Preventative Services Task Force (USPSTF) (2016). Screening for colorectal cancer recommendation statement. *Journal of the American Medical Association*, 315(23), 2564-2575. doi:10.1001/jama.2016.5989.
- Van Ryn, M., Lytle, L. A., & Kirscht, J. P. (1996). A test of the theory of planned behavior for two health-related practices. *Journal of Applied Social Psychology*, 26, 871-883.

- Vedel, I., Puts, M. T., Monette, M., Monette, J., & Bergman, H. (2011). Barriers and facilitators to breast and colorectal cancer screening of older adults in primary care: a systematic review. *Journal of Geriatric Oncology*, 2(2), 85-98.
- Vijan, S., Hwang, E. W., Hofer, T. P., & Hayward, R. A. (2001). Which colon cancer screening test? A comparison of costs, effectiveness, and compliance. *The American journal of medicine*, 111(8), 593-601.
- Wackerbarth, S.B., Tarasenko, Y.N., Joyce, J.M., & Haist, S.A. (2007). Physician colorectal cancer screening recommendations: An examination based on informed decision making. *Patient Education and Counseling*, 66(1), 43-50.
- Warren, J. L., Klabunde, C. N., Mariotto, A. B., Meekins, A., Topor, M., Brown, M. L., & Ransohoff, D. F. (2009). Adverse events after outpatient colonoscopy in the Medicare population. *Annals of internal medicine*, 150(12), 849-857.
- Wee, C.C., McCarthy, E.P., Phillips, R.S. (2005). Factors associated with colon cancer screening: The role of patient factors and physician counseling. *Preventive Medicine*, 41, 23-29.
- Wei, E.K., Ryan, C.T., Dietrich, A.J., & Colditz, G.A. (2005). Improving colorectal cancer screening by targeting office systems in primary care practices: Disseminating research results into clinical practice. *Archives of Internal Medicine*, 165, 661-666.
- Wenger, E. (1998). *Communities of practice: Learning, meaning, and identity*. Cambridge University Press.
- Wenger, E. (1998). Communities of practice: Learning as a social system. *Systems thinker*, 9(5), 2-3.

- Wenger, E. (2009). *Communities of practice in health and social care*. A. le May (ed.). Oxford, UK: Wiley-Blackwell.
- Wenger, E. (2010). Communities of practice and social learning systems: the career of a concept. In C. Blackmore (Ed.), *Social learning systems and communities of practice* (pp. 179-198). Springer London.
- Wenger, E., McDermott, R., & Snyder, W. (2002). *Cultivating communities of practice: A guide to managing knowledge*. Boston, MA: Harvard Business School Press.
- Wenger, E. & Wenger-Trayner, B. (2015). Communities of practice: A brief introduction. Retrieved from <http://wenger-trayner.com/introduction-to-communities-of-practice>
- Winawer, S.J., Fletcher, R.H., Miller, L., Godlee, F., Stolar, M.H., Mulrow, C.D., ...& Mayer, R.J. (1997). Colorectal cancer screening: Clinical guidelines and rationale. *Gastroenterology*, *112*, 594-642.
- Windsor, R.A., Baranowski, T., Clark, N., & Cutter, G. (1984). *Evaluation of health promotion and education programs*. Palo Alto, CA: Mayfield Publishing.
- Woolf, S.H. (2010). Patient and physician barriers to colorectal cancer screening. *Proceedings of Enhancing use and quality of colorectal cancer screening*. Bethesda, MD: National Institutes of Health.
- World Health Organization (WHO) (2011). Closing the gap: Policy into practice on social determinants of health. *World Conference on Social Determinants of Health*. Geneva, Switzerland: Author.

- Worthley, D.L., Cole, S.R., Esterman, A., Mehaffey, S., Roosa, N.M., Smith, A., ...& Young, G.P. (2006). Screening for colorectal cancer by faecal occult blood test: Why people choose to refuse. *Internal Medicine Journal*, 36(2006), 607-610.
- Zapka, J.M., Klabunde, C.N., Arora, N.K., Yuan, G., Smith, J.L., & Kobrin, S.C. (2011). Physicians' colorectal cancer screening discussion and recommendation patterns. *Cancer, Epidemiology, Biomarkers & Prevention*, 20, 509-521.
- Zapka, J.M., Klabunde, C.N., Taplin, S., Yuan, G., Ransohoff, D., & Kobrin, S. (2012). Screening colonoscopy in the US: Attitudes and practices of primary care physicians. *Journal of General Internal Medicine*, 27(9), 1150-1158.
- Zapka, J. G., & Lemon, S. C. (2004). Interventions for patients, providers, and health care organizations. *Cancer*, 101(S5), 1165-1187.
- Zapka, J. G., Puleo, E., Vickers-Lahti, M., & Luckmann, R. (2002). Healthcare system factors and colorectal cancer screening. *American journal of preventive medicine*, 23(1), 28-35.
- Zauber, A.G. (2010). Cost-effectiveness of colonoscopy. *Gastrointestinal Endoscopy Clinics of North America*, 20(4), 751-770.
- Zauber, A.G. (2015). The impact of screening on colorectal cancer mortality and incidence: Has it really made a difference?. *Digestive Diseases and Sciences*, 60(3), 681-691.