

June 2020

EPPM and Its Effectiveness in Advertisements of Colorectal Cancer Screening among Young Adults

Anh T. Nguyen
University of South Florida

Follow this and additional works at: <https://scholarcommons.usf.edu/etd>



Part of the [Mass Communication Commons](#)

Scholar Commons Citation

Nguyen, Anh T., "EPPM and Its Effectiveness in Advertisements of Colorectal Cancer Screening among Young Adults" (2020). *Graduate Theses and Dissertations*.
<https://scholarcommons.usf.edu/etd/8269>

This Thesis is brought to you for free and open access by the Graduate School at Scholar Commons. It has been accepted for inclusion in Graduate Theses and Dissertations by an authorized administrator of Scholar Commons. For more information, please contact scholarcommons@usf.edu.

EPPM and Its Effectiveness in Advertisements of Colorectal Cancer Screening among
Young Adults

by

Anh T. Nguyen

A thesis submitted in partial fulfillment
of the requirements for the degree of
Masters in Arts
Zimmerman School of Advertising and Mass Communications
College of Arts and Sciences
University of South Florida

Major Professor: Artemio Ramirez Jr., Ph. D
Janelle Applequist, Ph. D
Mark Bender, Ph. D
Yao Sun, Ph. D

Date of Approval:
June 18, 2020

Keywords: Advertisement Ethnicity, Logical Appeal, Emotional Appeal, Family Communication

Copyright © 2020, Anh T. Nguyen

TABLE OF CONTENTS

List of Tables	ii
List of Figures	iii
Abstract	iv
Chapter One: Introduction	1
Chapter Two: Literature Review	3
Colorectal Cancer Overview	3
Colorectal Cancer Screening Methods	5
Colorectal Cancer and Screening Rates in Minorities	7
Fear Appeals and the Extended Parallel Process Model	9
Social Media Use, Messaging and Cancer Prevention	15
Family Communication About Health	18
Research Questions	20
Chapter Three: Method	22
Experimental Research	22
Pilot 1	22
Pilot 2	24
Pilot 3	26
Primary Study	27
Chapter Four: Results	34
Hypothesis 1 and Research Question 1	34
Chapter Five: Discussion	38
Chapter Six: Limitations and Future Research	45
References	48
Appendices	54
Appendix 1: EPPM	55
Appendix 2: Messages Used in Study	56
Appendix 3: EPPM Measures	64
Appendix 4: IRB Approval	66

LIST OF TABLES

Table 1: Descriptives Associated with Pilot Study 2	30
Table 2: Descriptives Associated with Pilot Study 3	31
Table 3: Messages chosen for survey	32
Table 4: Descriptives and reliability coefficients for variables of interest (N = 547)	33
Table 5: Summary of final regression models predicting behavioral intention and fear control (N = 547)	37

LIST OF FIGURES

Figure 1: The Components of EPPM

55

ABSTRACT

Colorectal cancer is one of the deadliest types of cancer around the world and in the United States, yet it could be highly preventable by following the recommended guidelines of getting screened by the age of 50 and above. The focus of this study was on the Extended Parallel Process Model and sought to understand the efficacy and threat components in the fear appeal messages in the context of colorectal cancer screenings. Specifically, the study examined how young adults react when being exposed to those messages and whether they intended to discuss with their parents about it. The study also examined the logical and emotional appeals frequently used in communication as well as the role of advertisement ethnicity. The overall findings from the study support the application of the EPPM in colorectal cancer screening. Perceived threat and efficacy were significant predictors to behavioral intention, while threat also predicted fear control. Additionally, advertisement ethnicity and message types were also found to significantly predict behavioral intent. The implications of the findings for understanding the use of EPPM in the context of colorectal cancer screenings are discussed.

CHAPTER ONE: INTRODUCTION

Colorectal cancer is the second leading cancer killer in the United States (U.S.) (Carmeli, Dranikoff, Kundu, & Ladabaum, 2020). With the increase in the number of new cases of colorectal cancer and deaths related to it every year, health professionals have been finding way to encourage people who are 50 years old and above to comply to the recommended guidelines, which promotes colorectal cancer screening (Centers for Disease Control and Prevention [CDC], 2020). While being such a deadly type of cancer, colorectal could effectively be preventable by screening as the procedure could help detect any early signs of cancer and this is extremely helpful in getting cured. However, the number of people getting screened every year is still low and health professionals have looked for different ways to improve this number. In addition to the traditional media, health professionals have utilized social media for cancer promotional campaigns to efficiently target audience

Instead of focusing on the main target audience of colorectal cancer screening, this study focuses on the young adult audience, whose parents are usually within the target age group. There could be a more efficient way of persuading the audience in changing their behaviors. In addition, instead of just focusing on one specific audience, it could be more helpful to extend the audience as it could help spread the message to even more people.

The study is comprised of three pilots and one primary study to investigate whether the threats and efficacy components of the EPPM would affect the behavioral intention to discuss colorectal cancer with a parent of the audience. The study also examines different message appeals (logical and emotional) to see which one would be efficient in increasing the behavior

intention and affect audience's perception of colorectal cancer screening. In addition, the study looks at advertisement ethnicity and seeks to see whether it would be a significant predictor of the behavioral intention in the audience. Family communication in health is also discussed as it could be a new approach that could impact perspectives about colorectal cancer screening.

CHAPTER TWO: LITERATURE REVIEW

Colorectal Cancer Overview

Colorectal cancer (also known as colon cancer) is the fourth leading cause of cancer-related deaths worldwide (Arnold et al., 2017). In the United States, colorectal cancer is the second leading cancer killer and cause of death despite being highly preventable (American Cancer Society, 2020; Carmeli et al., 2020). According to the American Cancer Society, the number of new colorectal cancer cases in the United States each year is approximately 147,950 and is expected to cause 53,200 deaths in 2020 (American Cancer Society, 2020). The United States Centers for Disease Control and Prevention (CDC) stated that colorectal cancer affects men and women of all racial and ethnic groups, especially people who are 50 years old or older as about 90% of new cases of colorectal cancer occur to people in this age group (CDC, 2020). Specifically, it is estimated that among the annual colorectal cancer deaths, 55% occurs within the age group of 50 to 85. The risk of developing colorectal cancer is approximately 4.4% of men (1 in 23) and 4.1% of women (1 in 25) in a lifetime (American Cancer Society, 2020).

In recent decades, the death rate from colorectal cancer has dropped, and one of the key reasons was the preventative screening and early detection. Screening helps detect precancerous colorectal polyps so that they can be removed before they can develop into cancers or be found during the early stages when the disease is easier to treat (American Cancer Society, 2020). However, about one-third of eligible people do not undergo the necessary screening and comply with the guidelines (Carmeli et al., 2020; Sauer, Liu, Siegel, Jemal, & Fedewa, 2018). As a result, the CDC encourages people ages 50 and older should get screened for colorectal cancer as

it could save lives, while some groups recommend starting to get screened early at the age of 45 (CDC, 2020).

With colorectal cancer being the leading cause of death-related cancer, there have been multiple efforts to promote colorectal cancer screening by different health programs. For example, in 1999, CDC launched the “Screen for Life: National Colorectal Cancer Action Campaign” as a multimedia effort to promote colorectal cancer screening. The campaign included public service announcements and print materials such as factsheets, brochures, and posters. The campaign also has utilized engine marketing and digital advertising to reach the target audience, and as of September 2018, the efforts have gained more than 360 million impressions and two million clicks to the web pages (CDC, 2020).

Existing literature has also shown an increase in engagement in social media for colorectal cancer patients (Pellino et al., 2017), making it a potential tool that health organizations should optimize for their colorectal screening promotional campaigns. Another initiative by the National Colorectal Cancer Roundtable works with more than 1,500 organizations including medical professional societies, cancer centers, and government agencies, to reach the shared goal of 80% of adults aged 50 and older being regularly screened for colorectal cancer by 2018 (National Colorectal Cancer Roundtable, 2018). Existing literature has found that there are significant gains in screening participation when being exposed to screening information 2-3 times. In fact, even low levels of reported exposure to messages that promote colorectal cancer screening associated with higher screening participation (Cooper, Gelb, & Hawkins, 2014). Participants from this study have also reported that people with just one exposure to colorectal cancer screening information were three times more likely to answer

questions about colorectal cancer screening knowledge correctly compared to those who were not exposed.

Previous studies have also identified different barriers to the preventative screening of colorectal cancer, with the top reasons being lack of insurance, lack of patient awareness of the screening guidelines, and logistics challenges, as these affected 11%- 15% of the population (Carmeli et al., 2020). Consequently, it is important that programs overcome these specific challenges to increase the rate of colorectal cancer screening. This study will focus on the efforts of increasing awareness and behavioral changes in colorectal cancer screening for the target audience aged 50 and older through the young adult audience.

Colorectal Cancer Screening Methods

Screening has played an important role in decreasing the number of incidences and mortality rates of colorectal cancer, as it could help preventing the disease and reducing the cost of treatment if cancer is detected in early stages (Simon, 2016). Screening helps doctors detect any abnormal cells and treat cancer early before symptoms, which also makes it easier to take care of (National Cancer Institute [NIH], 2019). In addition, the 5-year survival rate for patients diagnosed in early stages (I and II) is approximately 90% compared to 13.1% for those that were diagnosed in later stage (Simon, 2016).

Currently, there are five screening tests that are used to colorectal cancer detection, including the fecal occult blood test, the sigmoidoscopy, the colonoscopy, the virtual colonoscopy, and the DNA stool test (NIH, 2019). A fecal occult blood test (FOBT) includes a Guaiac FOBT and immunochemical FBOT (also called the fecal immunochemical test or FIT) (NIH, 2019). These tests are designed to identify hemoglobin in the stool with the FOBT detecting the peroxidase activities and the FIT using human globin-specific antibodies to find

hemoglobin (Simon, 2016). The FIT has been widely used in preliminary screening for colorectal cancer as it is minimally invasive and cost-effective while still being a good indicator for colorectal cancer (Ye et al., 2017). The FOBT and FIT are recommended to be taken annually (Simon, 2016).

A sigmoidoscopy is another method of screening, in which the procedure includes examining the rectum and lower colon for polyps (NIH, 2019). While this method is effective in detecting and removing polyps, it is semi-invasive and requires special facilities and cost while only screens the distal colon (Simon, 2016). A sigmoidoscopy is recommended every five years in combination with FOBT (Simon, 2016).

Similarly, a colonoscopy follows similar procedure of a sigmoidoscopy, except that it allows screening of the entire colon. This method is more invasive, requires preparation and special facilities, and is more costly; however, a colonoscopy is still acknowledged as the golden standard for colorectal cancer screening (Simon, 2016; Ye et al., 2017). The screening interval of a colonoscopy is every 10 years (Simon, 2016). On the other hand, a virtual colonoscopy (or a computed tomography colonography [CTC]) uses x-rays to put together detailed images that could show polyps and is used only for patients that are not suitable for a colonoscopy (Simon, 2016; NIH, 2019). The test is repeated every five years (Simon, 2016).

Lastly, a DNA stool test could be used to examine the DNA in stool cells to look for genetic changes that could indicate colorectal cancer (NIH, 2019). This test minimally invasive, could be done at home, does not require any preparation, in addition to being covered by insurances which reduces its cost (Simon, 2016). The test is recommended for every three years (Simon, 2016).

Colorectal Cancer and Screening Rates in Minorities

In the U.S., African Americans have the highest death rate and the lowest survival rate for most types of cancer among any racial or ethnic groups (DeSantis, Miller, Sauer, Jemal, & Siegle, 2019). According to the American Cancer Society (2020), colorectal cancer incidence and mortality rates are the highest in non-Hispanic African Americans with 40.4%, followed by White (36.3%) and Hispanics (32.5%), with lowest in Asian Americans of 28.5%. Specifically, during the 2012-2016 period, the incidence rates in African Americans were about 20% higher than Caucasians and 50% higher than Asian Americans. The reasons for such rates vary; however, it could be explained that the gaps are due to differences in risk factors and socioeconomic status (American Cancer Society, 2020). In fact, people with the lowest socioeconomic status are 40% more likely to be diagnosed with colorectal cancer compared to those with the highest socioeconomic status. In addition, data has shown that the highest colorectal cancer survival rate are for Asian Americans at 68%, while the lowest are for African Americans at 60%. Similarly, this was strongly affected by the socioeconomic status that result in the differences in access to prevention, early detection and treatments (American Cancer Society, 2020).

Prior research stated that racial and ethnic minorities are more likely to develop cancer and die from it compared in the general population, and this is especially true in the case of colorectal cancer (Jackson, Oman, Patel, & Vega, 2016). Although the rates of colorectal cancer have decreased over the years, the disparities still exist when it comes to comparing the incidence and mortality rate to Caucasians, while African Americans tend to be diagnosed with colorectal cancer at younger ages compared to other groups (Jackson et al., 2016). As stated previously, the lack of screening could result in finding out about colorectal cancer in later

stages, leading to higher rates of mortality, and this has been shown to be a factor in delayed diagnosis in African Americans. The overall rate of colorectal cancer screening in African American is 62%, compared to 65% of Caucasians (DeSantis et al., 2019). Interventions and strategies have been utilized to increase the screening rates among African Americans; however, increasing availability of primary care physicians and colonoscopies has not decreased the gap in screening rates but rather the opposite has happened instead. As a result, different approaches need to be considered when reaching out to this audience.

Colorectal cancer is also the leading cancer type identified within the Hispanic population, and while the incidence rate has decreased overall and remained lower than Caucasians and African Americans, prior research has found that colorectal cancer tends to happen more to younger people (Jackson et al., 2016). Hispanics also have the lowest colorectal cancer screening rate compared to Caucasians and African Americans at 47%, and it was suggested in the study that interventions to improve screening rates should include direct access and education, especially targeted at the audience that has lower health literacy (Jackson et al., 2016). Hispanics were also less likely to look for information about cancer online (Zhao, Yang & Wong, 2019)

Asian Americans, despite having the lowest colorectal cancer rates among all the ethnic groups, still have collectively lower screening rates. A study by Rastogi and colleagues (2019) of disparities in colorectal cancer screening in New York City in 2014 revealed that screening uptake was 9% lower in Asian Americans compared to Caucasians (Rastogi et al., 2019). However, with the variety of subgroups within this category, the results vary when it comes to the specific rates within each group, making it more difficult to use the collective data as the guidance for each of the subgroup. All in all, education about different methods of colorectal

cancer screening and increasing the awareness about colorectal cancer might improve the screening rate (Jackson et al., 2016).

The report of colorectal cancer facts and figures 2020-2022 from the American Cancer Society noted that historical cancer data in the U.S. are available in the categories of white, black, and other race, which might indicate that further studies should examine the “other” category more closely to understand how different races and ethnicities could affect colorectal cancer and that the category was overlooked for a period of time. Racial and ethnic minorities should be viewed as different groups as the incidence and mortality vary within each group, instead of as a combined one (Jackson et al., 2016), as each group has its own culture and valuable beliefs that could strongly influence their perception on health and preventative cancer. By understanding this, health professionals could use different methods and approaches for each of the group, hence optimizing the effects of the health messages distributed to each group and motivate behavioral changes. With past studies not investigating messages across different ethnic groups, this research includes photo messages with different ethnicities to see whether a diverse population would feel more relatable to the messages, and whether they would be important predictors of the behavioral intention.

Fear Appeals and the Extended Parallel Process Model

In daily life, people are often exposed to different health messages that seek to change their behaviors (Sheeran, Harris, & Epton, 2014). Among the emotions, fear is widely used in health risk messages and is defined as a “negatively valenced emotion that results from appraisals of uncertainty in the face of a potential threat” (Witte, Martell, & Meyer, 2001; Myrick, 2015, pp. 29-30). Fear appeal is the most common persuasive message used in health campaigns as it evokes fear in the audience by portraying the negative consequences that would

occur if the audience does not perform a particular behavior (Witte et al., 2001). It was found that the feeling of fear would often motivate people to pay more attention to relevant information (Myrick, 2015).

Fear is an important emotion in preventative health messages because it can make a health threat that seems far away become more realistic and likely to happen (Myrick, 2015). This is based on the assumption that if used correctly, by increasing people's perceptions of risk or threats, they will act to practice healthy behaviors (Sheeran et al., 2014; Witte et al., 2001). While fear and threat are defined differently, they are related in the sense that the higher the perceived threat, the higher the fear experienced (Witte & Allen, 2000). For example, there are health messages on cigarette packs about the potential harm done to a person's health that are often used to encourage people to quit smoking and avoid preventable deaths (Sheeran et al., 2014).

It is important to note that fear appeal not only scares people, but also brings to mind different emotions (Myrick, 2015). It was also noted that from different studies of fear appeals, higher levels of fears were associated with a weak but stable positive influence on attitudes, intentions, and behaviors and that the fear appeals share a positive and linear association with message acceptance (Witte & Allen, 2000; Myrick, 2015). In addition, fear can motivate health information seeking in the audience once they receive the message (Myrick, 2015). Studies have found that risk appraisal has a causal role in changing behavior and heightening risk appraisals has more effect on intentions than on behaviors (Sheeran et al., 2014). Furthermore, the most effective type of message occurs when messages succeeded in heightening coping information as well as risk appraisals, in which "the effects of risk appraisals on outcomes were tempered by people's beliefs about the efficacy of the recommended action, their confidence about

undertaking that action, and their beliefs about the cost of so doing” (Sheeran et al., 2014, p. 534).

There have been different fear appeal theories and the Extended Parallel Process Model (EPPM) is one of the most recent developments in this area (Witte, 1992). This model consolidated fear as a causal mechanism in fear appeal effects while recognizing the cognitive appraisals related to threat and efficacy from previous theories (Myrick, 2015). EPPM is a message design theory in the fear appeal literature that provides a framework for the communication of health and risk-related information (Maloney, Lapinski, & Witte, 2011). The EPPM describes how people’s attitudes, intentions, and behaviors would be affected by fear messages based on two central constructs: threat and efficacy (Maloney et al., 2011).

Perceived threat is the subjective perception of the threat in the message given that motivates the audience to act and is comprised of perceived severity and perceived susceptibility (Maloney et al., 2011). Perceived severity is defined as one’s belief in the degree of the harm expected from the threat if they do not follow the suggestion, such as “Colorectal cancer could kill me” (Dunn et al., 2015). On the other hand, perceived susceptibility refers to one’s presumable belief that he or she would be affected by the threat. For instance, “I am at risk of getting colorectal cancer” (Chen & Yang, 2018; Popova, 2012). The two elements combining results in perceived threats, which determine the motivation to respond to fear arousing information (Chen & Yang, 2018).

The other construct of the EPPM is perceived efficacy. Perceived efficacy has a strong impact on people’s actions and is defined as an individual’s beliefs in their ability to perform a recommended behavior to avoid threats (Chen & Yang, 2018; Dunn et al., 2015). Perceived efficacy consists of perceived response efficacy and perceived self-efficacy. Perceived response

efficacy refers to an individual's beliefs about whether the recommended suggestion would effectively prevent the threat, such as "I believe that screening could help prevent colorectal cancer." Meanwhile perceived self-efficacy is defined as an individual's beliefs to his or her ability to perform the recommended solution such as "I think I can easily get a colorectal cancer screening" (Maloney et al.,2011; Chen & Yang, 2018; Martin, 2017; Termeh Zonouzy, Niknami, Ghofranipour, & Montazeri, 2018).

The EPPM explains how the combination of rational considerations (efficacy beliefs) and emotional reactions (fear of a health threat) determine behavioral decisions (Martin, 2017). In persuasive health messages, the information should contain threat appeals that grab the audience's attention before coming up with recommendations that would help cope with those threats as this combination would encourage the audience to perform protective behaviors (Chen & Yang, 2018). The EPPM is said to be useful in guiding many decisions of public communication campaigns (Popova, 2012). EPPM explains the possible responses that people may have to fear appeal messages including non-responses, danger control responses, and fear control responses. The theory predicts which of these individuals' responses would show depending on the interaction between their perceptions of the threat and the efficacy to avert the threat (Maloney et al., 2011).

The EPPM suggests that while an individual's motivation to respond to a fear appeal message depends on how much the message increases his/her perception of a threat, the perceived efficacy would determine the nature of one's reactions (Maloney et al., 2011; Chen & Yang, 2018). In other words, how much a person feels threatened by a health issue would determine his or her motivation to act, while the confidence to reduce or prevent the threat would determine the action itself (Martin, 2017). It is important to note that there are interactions

between perceived threat and perceived efficacy, and the possible combinations of the two components are 2 x 2 (threat [high, low] x efficacy [high, low]) (Shi & Smith, 2016). The EPPM states that when being exposed to a fear appeal, the audience may respond to the threat in one of the three directions: no responses, danger control, and fear control (Popova, 2012).

The process of EPPM has the following steps. First, when an individual views a message, he or she determines if the perceived threat is severe and if his or her susceptibility to the threat is high enough for him or her to proceed further and look for more information about the threat (Maloney et al., 2011). If the perceived threat is low, individuals will likely not be motivated to take actions, hence no response (Dunn et al. 2015). If the perceived threat is high, the individual will experience fear and enter the efficacy stage, and as a result will be motivated to reduce the fear by engaging in danger control processes or fear control processes depending on the efficacy appraisal (Maloney et al., 2011). If the threat is stronger than the efficacy, individuals will engage in maladaptive behaviors such as avoiding information about the threat or reject the message. This is the fear control response in the EPPM in which individuals control fear rather than danger and would result in defensive avoidance (Myrick, 2015; Maloney et al., 2011; Dunn et al., 2015). However, if the efficacy is as high or higher than the threat, the opposite situation would likely happen. In this case, individuals will engage in adaptive and danger control responses (Myrick, 2015). Danger control is defined as the cognitive process when an individual believes he or she can effectively avoid the threat through performing protective behaviors (Popova, 2012). Consequently, a message with high threat and high efficacy would likely produce optimal results in seeking to change one's behavior. It has been found from empirical studies that higher levels of threat and higher levels of efficacy show that there is a positive

linear relationship between fear appeal messages and persuasion (Myrick, 2015; Witte & Allen, 2000).

EPPM has long been applied in preventative health contexts, especially in cancer prevention campaigns such as skin, breast, or colorectal cancer. For example, a study by Chen and Yang (2018) used EPPM to evaluate the effectiveness of fear appeal messages to increase the intention of breast self-examination among Chinese women and the significant two-way interaction effect between threat and efficacy was revealed. The study shows that Chinese women who received messages with high threat and high efficacy had the highest motivation for breast self-examination (Chen & Yang, 2018). Another study that adopted EPPM to test the impact of breast cancer prevention information on mobile-based social media also found supporting evidence that information with both high levels of threat and efficacy gained the largest number of interactions on WeChat, and that both threat and efficacy components affected the number of readings (Chen et al., 2019). The results from both studies are consistent with existing literature about EPPM.

In addition, Dunn and colleagues (2015) utilized EPPM-based intervention and found that it was effective in promoting colorectal cancer screening and that each component of the EPPM contributed individually is a better fit to motivate colorectal cancer screening behaviors (Dunn et al., 2015). Additionally, it was noted in the study of Dunn et al. (2015) that while fear appeals and threat need to be high for the efficacy stage to happen, the perceived severity of cancer could be different from other types of fear appeals as cancer is often viewed as dreadful and could impact people's lives tremendously. Because of how fearful cancer is viewed, people could be hesitating in getting cancer screening because of the idea that they might be diagnosed with it (Dunn et al., 2015). This is an important note as fear appeal messages could be a two-edged

sword that health professionals need to be aware of when working on preventative health messages for cancer, as people could likely respond to such messages with fear control instead of danger control.

Shi and Smith (2016) focused on the effects of repeated exposure to fear appeal message on perceived threat and efficacy, and behavioral intentions using the EPPM model with the topic of skin cancer and college students. The study showed that while perceived threat and efficacy could differ depending on the number of times a message receives exposure, a high-threat and high efficacy threat appeal message would still be effective and should lead to the danger control responses after repeated exposures (Shi & Smith, 2016).

Social Media Use, Messaging and Cancer Prevention

Many health campaigns have utilized social media such as Facebook and Twitter for advertising and spreading awareness. In the U.S., in the first quarter of 2020, Facebook was the biggest social network worldwide, with 2.6 billion monthly active users (Clement, 2020). About seven-in-ten U.S. adults use Facebook, and around 74% visit the site at least once a day, with 43% consuming news from Facebook (Gramlich, 2019). In regard to age, 90% of U.S. adults aged 18-29 use Facebook (Demographics of Social Media Users and Adoption in the United States, 2019).

Neiger and colleagues (2012) proposed the five purposes for use of social media in public health and health promotions, including communicating with the audience for insights, establishing and promoting a brand with the audience, distributing critical information, expanding reach to include more diverse audiences, and promoting engagement with the audience. In general, social media provides the digital space for health promotion messages that focus on cancer prevention and early diagnosis, and has become an important tool in distributing

cancer prevention information (Kaushal, Kassianos, Sheringham, Waller & Von Wagner, 2020; Zhang et al., 2019). The platform also gives the audience the opportunity to connect with people who have similar experiences with the diagnosis, as many people use social media to seek out health information and discuss with others about shared conditions (Prochaska, Coughlin, & Lyon, 2017; Zhang et al., 2019). In addition, social media offers real-time communication between patients and healthcare providers (Kaushal et al., 2020). Although unable to completely eliminate health disparities, social media has helped increase efficiency in reaching a diverse audience who may not be accessed through traditional approaches, either because of specific geographical regions or locations of hard- to- reach groups due to barriers of screenings and lack of knowledge, while also allows information to be spread through social network connections (Neiger et al., 2012; Zhang et al., 2019). Health professionals have acknowledged the important role of social media in reaching large audiences and have used it as a tool to increase cancer education while not being affected by geographical boundaries (Neiger et al., 2012; Heo, Chun, Lee, & Woo, 2016).

Existing literature has studied different message appeals and what elements result in the highest tendency of being shared. For example, a study by Chung (2017) revealed that messages describing impacts from hazards were more frequently retweeted, and that messages including features such as photos and images also increased the likelihood to be retweeted. In addition, research has revealed that tweets with high emotional and informational components had higher tendencies of being retweeted (Chung, 2017).

There are two types of message appeals that are often studied including logical appeals and emotional appeals. A logical (or rational) appeal contains facts, statistics, and figures, while an emotional appeal includes vivid and personal elements to bring out the emotional experiences

associated (Kim & Choi, 2017). Prior literature expected that the audience would perceive higher levels of risk and perceived probability with an emotional appeal message compared to a logical appeal message, as people would use emotions provoked by emotional message when evaluating risks rather than those by numbers and facts (Kim & Choi, 2017). Previous research has supported the predictions with results showing that messages including personal experiences and narratives were more likely to be shared and would reach the most audience, as the use of narrative formats such as personal stories could increase the possibilities of posts being shared as it could increase the audience's involvement with the messages (Zhang et al., 2019; Chung, 2017). These findings, however, were in contrast with past studies that suggested messages were shared because of the informational and reliable factors, and a recent study of Zhang and colleagues (2019) on social media and cervical cancer prevention supported the outcome that tweets with factual information were significantly shared more, compared to those with personal experiences. The conclusion from the study suggested that it is a causal effect of factual information on increasing sharing behavior (Zhang et al., 2019). As a result, it is important to continue studying the different message appeals as it would be helpful in determining which appeals would be the most effective one in reaching the audience and increase their awareness on cancer prevention.

Being popularly used by the young adult population, Facebook has the potential channel to target the audience with different health advertisements and messages effectively. Facebook was also the most frequently used platform for interventions using social media for cancer prevention (Han, Lee, & Demiris, 2018). In fact, many public health organizations have been delivering preventative health messages using social media for interactive interventions. For instance, the CDC launched a breast cancer awareness campaign on Facebook (Prochaska et al.,

2017). Another example would be the Tobacco Status Project, a Facebook intervention for young adult smokers, which turned out to have a high engagement rate with 92% participation (Sarkar et al., 2018). Social media was also found to be a useful tool for health organizations to target young women with messages about the dangers of sunbathing and indoor tanning to influence their attitudes and prevent skin cancer (Willoughby & Myrick, 2019). Social media could also help reach more people in a specific target audience more easily and effectively while maintaining being a low-cost option (Morrison et al., 2019).

Studies have revealed that the most common sources of colorectal cancer screening include news reports and advertisements, with 46.5 % and 39.4% of the people exposed saw the messages on these platforms, respectively (Cooper et al., 2014). As a result, having preventative health advertisements on social media would be a very efficient way to reach the audience for optimal results, including motivating them to change their behaviors.

Family Communication About Health

A limited number of studies have examined the relationship between one's health behaviors and family communication. The interactions between family members could have a great impact on an individual's development of health, whether they commit to healthy or unhealthy behaviors, and health status (Bylund & Duck, 2004). In other words, family members may influence each other's health behaviors in both beneficial and unbeneficial ways (Baiocchi-Wagner, 2015). Family has been identified as the primary influence on the collective as well as the individual members' health, including health capacities and health decisions (Gafner, 2018). In fact, the parent-child relationship is an influential one as the parental interaction with their children may directly affect the children's behaviors, while a reciprocal interaction from the children could also influence the parent's behaviors (Gafner, 2018).

Existing literature has found that the frequency with which individuals discuss a particular health topic with family members affects their health behaviors in positive ways (Baiocchi-Wagner & Talley, 2013). For example, it was discovered that young adults would engage in safer alcohol and sex practices with frequently discussing with parents (Booth-Butterfield & Sidelinger, 1998). Another study by Baiocchi-Wagner and Talley (2013) also found a consistent result that family health communication has a strong impact on an individual's healthy diet, in which individuals from families that frequently discuss diet and physical activities are more likely to perform a healthy diet and physical activities-related behaviors. Gafner (2018) suggested that having a strong support network would help family to cope better when a health crisis arises, and supportive communication could strongly improve an individual's health while proactive communication about health within the family can positively affect the well-being of the family members. This study seeks to look at the proactive approach in which the children would be more aware of the type of cancer that could affect their parents and be able to discuss the preventative methods with them, instead of the reactive approach which might happen after such disease was already diagnosed.

This research conducted an experiment by exposing young adolescents (ages 18-25) to different photo messages and advertising about colorectal cancer screening and assessed how effective they could be in asking participants to communicate about colorectal cancer screening with their parents, who are often within the age of the target group (50 and above). The purpose of the study is to fill the literature gap in addressing the best practices of social media usage in health communications of cancer screening and prevention.

Research Questions

With screening being an extremely efficient way to detect colorectal cancer early and prevent related deaths, it is important to learn which elements and components would efficiently deliver the messages and optimize the outcomes. This research is important because social media is such a popular network for young adults, and it would be useful to utilize such revenues to target young adolescents and raise their awareness about colorectal cancer and preventative screening. The study offers a different view on preventative cancer screening as instead of targeting the direct audience of people who are at risk of colorectal cancer, the messages target young adolescents who are not necessarily concerned about the disease since it is mostly for people 50 and above. However, the study seeks to see whether family communication could be a beneficial factor that future research could implement into campaigns to increase the impact of such preventative cancer messages and potentially lead to significant changes in health behaviors.

Per previous research utilizing the EPPM, it is predicted that efficacy and threat significantly affect participant response to messages asking them to discuss colorectal cancer screening with a parent. Specifically, the present study debates whether EPPM can predict participant behavioral intention as a response to a message as well as a fear response (fear control). The first hypothesis states:

H1: Efficacy appraisal and threat appraisal will significantly predict (a) behavioral intention to discuss colorectal cancer screening with a parent and (b) fear control response.

The present study examines EPPM through the use of advertisements employing photographs depicting different family ethnicities. In addition, the type of appeal

(emotional/logical) was also manipulated. However, since published research has not tested EPPM predictions in either context, the following research question is proposed:

RQ1: Does the (a) ethnicity of the families depicted and (b) type of appeal predict (a) behavioral intention to discuss colorectal cancer screening with a parent and (b) fear control response?

CHAPTER THREE: METHOD

Experimental Research

The present investigation involved three pilot tests to develop and assess the experimental materials before their use in the primary study examining the research questions and hypotheses. The first pilot assessed participants' perception of the advertisements and messages shown to them about colorectal cancer screening. The second pilot test attempted to improve the messages intended to use for the primary study based on feedback from the initial pilot. Specifically, instead of having photos of only a young adult accompanying each message, photos of a young adult and a parent were tested to assess whether they improved message clarity. The third pilot test was conducted to identify which messages would be ranked as the most logical and emotional. A total of 16 messages were used for this pilot using different aspects of the logical and emotional appeal. Each pilot test is discussed below.

Pilot 1:

This first pilot sought to understand the participants' perception of the advertisements and messages shown to them about colorectal cancer screening. The survey was distributed via Qualtrics, and the participants were college students at the University of South Florida (USF) recruited. At the beginning of the questionnaire, the participants were asked to read the consent form that was approved by USF Institutional Review Board (IRB), which included information about the scope of the study and how their information was protected, in which participants clicked on "I agree to participate in the study" before being able to proceed to the actual questions.

The participants were asked three questions at the beginning of the survey to determine if they would be the appropriate target audience, including whether the participants were Facebook users, if they had at least one parent that was alive, and if they had at least one parent that was 45 or older (which was the recommended screening age for average-risk adults by the 2018 American Cancer Society Guideline) (Wolf et al., 2018). Participants were then shown four different advertisements with two male and two female young adults with information about colorectal cancer screening that would concern their parents (for example, one of the advertisements has the following text: Are your parents 45 or older? It might be time for their colorectal cancer screening. Colorectal cancer is the second leading cancer killer in the U.S., but it is largely preventable by screening. Colorectal cancer screening saves lives. Talk to your parents today about screening”). The advertisements were randomized so that each participant would get one advertisement with a male and one advertisement with a female.

The participants were asked the same questions after they were shown each advertisement. The first group of questions was bipolar scales, where they were asked to rate what they think about the advertisement that they were just exposed to (i.e.: logical- emotional, persuasive- unpersuasive, fearful- unfearful, etc.). After that, they were asked a multiple-choice question of whether the advertisement would encourage them to discuss colorectal cancer screening with their parents, and an open-ended question about what they liked and disliked about the advertisement. At the end of the questionnaire, demographic and family history data was collected from the participants. Specifically, participants were asked if their families have had any colorectal cancer history (which would essentially increase the risk of having colorectal cancer for other members in the family), what was their biological sex, how would they describe themselves in terms of race, and how much time they spend using Facebook per day.

87 responses were recorded; however, only 61 responses answered all questions. Among the participants, 41 were female, 19 were male, and one preferred not to answer. In addition, two participants were mixed race, four were Asian, nine were African American, 11 were Hispanic, and 35 were Caucasian. Data from this pilot was extracted to Excel so that the participants' feedback and what they liked and disliked about the advertisements could be reviewed. While some participants thought the messages were informative and logical, there was feedback about how the text was extremely wordy, and they did not like the pictures chosen for the advertisements. Another important note taken from the pilot is that some participants reported the advertisement did not make sense to them - some commented that the young adults in the messages were too young to be 45 and older, and misunderstood the intention of the advertisement that they were talking about their parents who were within the target audience of the message. Based on the feedback, the next pilot selected different photos and reduced the text so that they could be more concise while remaining clear so that it would not confuse the next participants.

Pilot 2:

To improve the advertisements intended for use in the actual survey, different photos were chosen in this pilot. Instead of just having the photos of a young adult in the advertisement, photos of a young adult and a parent were picked to avoid the confusion that happened in pilot one. The biological sex of the parent and child was also matched (i.e., daughter with mother and son with father) with the same race. The photos were picked so that they would represent the four major races in the U.S., including African American, Caucasian, Hispanic and Asian, for a total of eight possible photos to choose from. Each of these photos was designed to go with one logical and one emotional statement, resulting in 16 advertisements altogether.

In terms of the texts in the advertisements, different components of logical and emotional appeals were tested. An example of an emotional appeal from the advertisement would be: “If your parents are 50 and older, make sure they are up to date on colorectal cancer screening. When my mother was diagnosed with colorectal cancer, all I wished was that she took the screening sooner as that would help detect the disease in its early stages. I regret it every day.” On the other hand, an example of a logical appeal would be: “Are your parents 50 and older? It’s the time for their colorectal cancer screening. Colorectal cancer is the 3rd most commonly diagnosed cancer, and 1 in 3 people are not up-to-date on screening. Screening helps detect cancer early and save lives.” The emotional appeal was given more feelings and while the logical appeal was expressed with more facts and numbers related to colorectal cancer screening. For this pilot, the participants were asked to rate how much they agreed with the statements shown based on the advertisement that they were just exposed to. The answers were a 5-point scale based on the Likert scale, with one being strongly disagree and five being strongly agree. The questions asked the participants if they look can the advertisement and picture themselves in it, if they could relate to the people in the advertisement, and if the advertisement was realistic. The purpose of this pilot was to test if the photos were relatable and genuine and if they would be a distracting factor when people look at the advertisement which might prevent them from focusing more on the conveyed message as happened in Pilot 1.

The sixteen advertisements were divided into four different questionnaires; each consisted of four advertisements with two female, two male, two logical, and two emotional appeals messages. Each questionnaire also contained advertisements with all four of the races mentioned above, and there were no repetitions of the same race in each group (i.e., each questionnaire would have one advertisement of African American, Caucasian, Hispanic, and

Asian). The surveys were administered on Qualtrics and distributed through MTurk. There were no restrictions on the participants, and anyone who took the survey was given \$0.25. Twenty to 21 people took each questionnaire, totaling 81 people participating in this pilot. The collected data was then imported into SPSS, and by doing one-way ANOVA, no significant results were found about the advertisements used. As a result, all eight photos were kept and used in the primary study. (See Table 1 for descriptives on Pilot 2)

Pilot 3

Contrary to Pilot 2, Pilot 3 sought to identify which messages would be ranked as the most logical and emotional. A total of 16 messages were used for this pilot using different aspects of the logical and emotional appeal. The messages were based on Pilot 2 but were edited so that they could be stronger and darker in emotion, and show a more extensive range of logic and emotions. An example of a logical statement in this pilot would be: "If your parents are 50 or older, make sure they are up-to-date on their colorectal cancer screenings. Age is the #1 factor for colorectal cancer- 90% of cases appear in men and women ages 50 and older." An emotional statement in this pilot was: "If your parents are 50 or older, make sure they are up-to-date on their colorectal cancer screenings. This photo is the last one I took with my father. He passed away a year later from colon cancer. If he had been up to date with his screening, he would still be here today. I wish I had known that early screenings could have saved his life." The sixteen messages were also divided up into four separate questionnaires, each of which consisted of two emotional and two logical statements. For this pilot, participants were asked to rate how they perceived the messages and answered a 5-point scale based on the Likert scale, with one being strongly disagree and five being strongly agree. The questions sought to find out whether

participants would find the message easy to understand and how much they would agree that the message was logical or emotional.

Similar to Pilot 2, Pilot 3 was also distributed using MTurk. Twenty to 21 people took each questionnaire, resulting in 82 participants in this pilot. Again, there was no restriction on the participants, and anyone who took the survey was given \$0.25. The collected data was also imported into SPSS, and by analyzing it with descriptive stats and one-way ANOVA, the two messages that had the top scores as logical and two that had the top scores as emotional were picked out for the actual survey. The messages were kept as they were since there were no issues with whether the messages were easy to understand. (See Table 2 for descriptives on pilot 3 and Table 3 for the messages used for study.)

Primary Study

Based on the pilots, the final survey consisted of the photos and messages that would potentially be free of all distracting factors. As mentioned above, four messages in total were used in all eight photos, and they were randomly paired to produce sixteen advertisements. Similar to the previous pilots, the sixteen advertisements were divided into four separate questionnaires, and each consisted of four advertisements with two females, two males, and two logical and two emotional appeals messages. The advertisements were randomized so that each participant was asked for their opinions about two advertisements.

The survey was conducted on Qualtrics and distributed via MTurk. Participants needed to be between 18-25 years of age and were paid \$0.75 each for completing the survey. Although there were four separate questionnaires, this was still one study overall. As a result, in order to not have the same person taking two questionnaires, each questionnaire was published one at a time. After the first one was finished, the data was exported, and the participants' IDs were put

into an Excel list. This list was then uploaded to the next batch for additional qualifications, and these people were excluded from taking the following questionnaires. This way, it was ensured there would be no participant repetitions.

Before starting the survey, participants were asked to read the IRB consent form and needed to click on "I agree to participate in the study" before being able to proceed. Similar to pilot 1, participants were asked if they were Facebook users and whether they had at least one parent alive who was over 50 years of age. After that, each participant would move on to the main part of the survey - the advertisements about colorectal cancer screening.

The questions asked in this section aimed to measure the perceived threat and perceived efficacy. The questions were based on the Risk Behavior Diagnosis (RBD) Scale, adapted from EPPM (Gould, Watt, Cadet- James, & Clough, 2015; Witte et al., 2001). The components were measured on a 5-point Likert scale, ranging from strongly disagree to strongly agree.

Susceptibility ($\alpha = .751$) was measured using three items that assessed to what extent participants perceived their parents' level of risk for experiencing colorectal cancer. Severity ($\alpha = .867$) was measured using three items to evaluate to what extent participants perceived that colorectal cancer is a serious threat to the parents. Self-efficacy ($\alpha = .807$) was measured using three items to determine to what extent participants perceived how easy it would be for their parents to get screened for colorectal cancer. Response-efficacy ($\alpha = .713$) was measured using three items to see to what extent of effectiveness that participants perceived about colorectal cancer and whether it could prevent the disease. Behavioral intention ($\alpha = .926$) was also measured using three items to determine whether participants had the intention to discuss with their parents about colorectal cancer screening. Fear control was measured using a singular item to determine whether the participants would avoid the thought of colorectal cancer screening and not wanting

to discuss with their parents about the topic (See Table 4 for Descriptives and reliability coefficients for variables of interest and Appendix 3 for the RBD scale and EPPM measures used in the survey).

The survey also asked questions to determine which of the characteristics in a message would be effective on the behavioral intention. The participants were asked to rate whether the advertisements exposed to them were logical or emotional, fearful, or unfearful based on the 7-point bipolar scale. Participants were also asked to share their family history of colorectal cancer and how familiar they were with the disease. The survey also asked for the biological sex, race, and the amount of time they spend using Facebook every day. Essentially, 354 responses were recorded.

Table 1. Descriptives Associated with Pilot Study 2

Advertisement	1. See themselves in the advertisement		2. Relatable		3. Realistic	
	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
1	3.85	.587	3.80	.834	4.30	.657
2	3.75	.716	4.20	.834	4.20	.523
3	3.80	.765	4.05	.826	4.30	.571
4	3.85	.813	4.00	.649	4.20	.616
5	3.86	1.014	4.14	.964	4.00	.632
6	3.76	.831	3.90	.944	4.24	.700
7	3.76	.831	3.67	.913	3.81	.873
8	4.00	.894	4.05	.921	4.14	.727
9	3.85	1.040	3.75	1.203	4.45	.686
10	3.65	.933	3.40	1.095	4.26	.653
11	3.50	1.147	3.45	1.395	3.85	1.089
12	3.35	1.089	3.40	1.095	4.25	.639
13	3.30	1.031	3.45	1.099	4.25	.716
14	3.25	1.020	3.20	1.152	3.90	.912
15	3.15	1.040	3.30	1.129	3.95	.887
16	3.20	1.196	3.45	1.234	3.75	.910
Total	3.62	.964	3.70	1.058	4.11	.762

Table 2. Descriptives Associated with Pilot Study 3

Advertisement	1. Easy to understand		2. Message is logical		3. Message is emotional	
	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
1	4.05	1.071	4.48*	.814	4.25	.693
2	4.24	.700	4.33*	.577	3.05	1.322
3	4.33	.913	4.24	.768	4.14	.964
4	4.43	.676	4.33	.658	3.29	1.189
5	4.15	.745	4.30	.865	4.00	.918
6	4.05	.945	4.10	.852	3.75	.967
7	4.00	.918	4.10	.788	4.10	1.021
8	4.15	.875	3.75	1.070	3.50	1.114
9	4.05	1.099	4.35	.875	4.10	.968
10	4.35	.988	4.25	1.020	3.95	1.050
11	4.10	1.021	4.15	.875	4.35*	.745
12	4.25	.910	4.10	.968	3.45	1.234
13	4.10	.889	4.10	.768	4.14	.854
14	4.00	.837	3.86	.910	3.95	1.024
15	3.90	.889	4.14	.727	4.19*	.873
16	3.71	.845	4.05	.740	4.05	1.071
Total	4.12	.898	4.16	.837	3.89	1.057

*: messages that were picked for primary study.

Table 3. Messages chosen for survey.

Appeal	Message
Logical (#1)	<p>If your parents are 50 or older, make sure they are up-to-date on their colorectal cancer screenings.</p> <p>When my mom was diagnosed with colorectal cancer, all I wished was that she had completed the screening sooner. I regret this every day. Earlier detection would have made her treatment so much easier.</p>
Logical (#2)	<p>If your parents are 50 or older, make sure they are up-to-date on their colorectal cancer screenings.</p> <p>Age is the #1 risk factor for colorectal cancer - 90% of cases appear in men and women ages 50 and older.</p>
Emotional (#11)	<p>If your parents are 50 or older, make sure they are up-to-date on their colorectal cancer screenings.</p> <p>Early detection saves lives. You still have a lot of memories to make with your parents. Talk to your parents about colorectal cancer screening so that you can enjoy more tomorrows.</p>
Emotional (#15)	<p>If your parents are 50 or older, make sure they are up-to-date on their colorectal cancer screenings.</p> <p>Don't let your loved one die young because of a preventable illness. Early detection of colorectal cancer saves lives. Talk to your parents today.</p>

Table 4. Descriptives and reliability coefficients for variables of interest (N = 547).

Variable	Cronbach's alpha	Mean	Std. Deviation
Susceptibility	.751	4.01	1.26
Severity	.867	3.41	1.40
Self-efficacy	.807	4.47	1.31
Response efficacy	.713	4.19	1.48
Behavioral intention	.926	3.21	1.53
Danger control	N/A	4.01	1.78

Note: Per EPPM, susceptibility and severity are summed to produce *threat appraisal*. Self-efficacy and threat efficacy are summed to produce *efficacy appraisal*.

CHAPTER FOUR: RESULTS

The survey was taken by 354 participants ages 18-25, including 167 males and 156 females. Thirty-one participants preferred not to disclose gender. The population also included 179 Caucasians, 73 Asians, 70 Hispanics, 23 African Americans, and ten participants identified as “others”. Because each participant was shown two advertisements, one response was split into two entries. When viewing the data, it was found that some of the questions were not answered completely. As a result, those entries were removed from the data set. In addition, those who answered “no” on the first three questions of the survey (i.e. whether the person was a Facebook user, if they still had at least one parent that was alive, and if they had at least one parent that is 50 years or older) were also removed from the data set. The reason behind this was that the target audience might not be as affected by the messages if they were not in such situations. As a result, 161 entries were removed from the data set and the remaining entries were 547. The data was then imported into SPSS for conducting analysis.

Hypothesis 1 and Research Question 1

The first hypothesis predicted that efficacy and threat would significantly predict behavioral intention to discuss colorectal cancer screening with a parent and fear control response. The research question asked whether the addition of ethnicity of the families depicted in the advertisements and type of appeal used predicted behavioral intention to discuss colorectal cancer screening with a parent. Both the hypothesis and research question were examined via a pair of step-wise entry multiple regression analyses. The first analysis regressed behavioral intention on advertisement ethnicity and message type entered as the first block followed by

threat appraisal and efficacy appraisal entered as the second block. The second analysis, regressing fear control, followed the same procedure.

Table 5 reports the results of the analyses. For behavioral intention to discuss colorectal cancer screening with a parent, the overall model was statistically significant, $F(7, 539) = 29.637, p < .001, R^2 = .278$. The table also shows that each of the blocks accounted for a significant amount of variance. Specifically, the variables entered in step 1 (advertisement ethnicity, message type) accounted for 5.5% of the variance in behavioral intent, whereas the variables entered in step 2 (threat appraisal, efficacy appraisal) accounted for an additional 22.3% of the variance. The table also shows that all of the variables emerged as significant predictors.

For fear control, the overall model also was statistically significant, $F(7, 539) = 9.360, p < .001, R^2 = .108$. As with behavioral intention, each of the blocks of variables accounted for a significant amount of variance. The variables entered in step 1 (advertisement ethnicity, message type) accounted for 2.2% of the variance in fear control. The block of variables entered in step 2 (threat appraisal, efficacy appraisal) accounted for 8.6% of additional variance in the outcome. Table 2 indicates that two variables, advertisements featuring Latino/Hispanics and threat appraisal, emerged as significant predictors (See Table 5 for summary of final regression models).

To summarize, hypothesis 1 was supported for behavioral intention to discuss colorectal cancer screening with a parent. Both threat appraisal and efficacy appraisal significantly predicted behavioral intention ($\beta = .167, p < .001$; $\beta = .373, p < .001$, respectively). However, the hypothesis was only partially supported for fear control as only threat appraisal emerged as a significant predictor ($\beta = -.324, p < .001$).

In terms of the research question, both advertisement ethnicity and message type significantly predicted behavioral intention to discuss colorectal cancer screening with a parent; advertisement ethnicity, in the form of those featuring Hispanics, also significantly predicted fear control. Specifically, all four major ethnic groups tested were significant predictors for behavioral intention to discuss colorectal cancer screening with a parent: African Americans ($\beta = .090, p < .05$), Asian Americans ($\beta = .126, p < .001$), Hispanics ($\beta = .102, p < .05$), and Caucasians ($\beta = .099, p < .05$). In addition, the message type (logical or emotional) significantly predicted behavioral intention ($\beta = -.097, p < .05$). On the other hand, the Hispanics group was a significant predictor for fear control ($\beta = .123, p < .05$) (See Table 5 for the summary of final regression models).

Table 5. Summary of final regression models predicting behavioral intention and fear control (N = 547).

Predictor	Behavioral Intention			Fear Control		
	B	S,E,	β	B	S,E,	β
Advertisement Ethnicity						
African American	.376	.158	.090*	-.046	.290	-.007
Asian American	.335	.103	.126**	.239	.189	.054
Hispanic/ Latino	.247	.095	.102*	.493	.175	.123*
White/ Caucasian	.584	.220	.099*	.663	.404	.068
Message type	-.198	.075	-.097*	-.185	.138	-.055
Threat Appraisal	.133	.033	.167**	-.426	.061	-.324**
Efficacy Appraisal	.268	.031	.373**	.092	.056	.077
Constant	3.481	.074	--	5.935	.455	--

*p < .05; **p ≤ .001

Note: In behavioral intention, the first block of variables (advertisement ethnicity, message type) accounted for 5.5% of the variance. The variables entered in step 2 (threat appraisal, efficacy appraisal) accounted for an additional 22.3% of the variance.

In fear control, the first block of variables (advertisement ethnicity, message type) accounted for 2.2% of the variance. The variables entered in step 2 (threat appraisal, efficacy appraisal) accounted for an additional 8.6% of the variance.

CHAPTER FIVE: DISCUSSION

The purpose of the study was to investigate whether EPPM could predict participants' behavioral intention to talk about colorectal cancer screening with a parent and fear response when being exposed to messages about colorectal cancer screening and how it could affect their parents. The study also sought to see whether advertisement ethnicity and type of message appeals (logical or emotional) would predict the intention to discuss with a parent and fear response to colorectal cancer screening. The results revealed that both threat and efficacy appraisals were significantly predictors of behavioral intention. In addition, advertisement ethnicity was found to be associated

The components of threat and efficacy from the EPPM were tested, and the results from the study revealed that both threat and efficacy significantly predicted behavioral intention to communicate about colorectal cancer screening with a parent. In other words, the higher the threat and efficacy are, the intention to perform the behavior would be more likely to take place and the message is also the most persuasive in this case (Shi & Smith, 2016). This is consistent with existing literature about the EPPM that when both threats and efficacy are high, the audience will enter the cognitive process to control danger (Gould et al., 2015; Chen & Yang, 2018), which in this case, participants would communicate with their parents about colorectal cancer screening. The finding has confirmed that the combination of high threat and high efficacy would be efficient for preventative health/cancer messages in positively affecting the intention to perform the recommended behaviors.

On the other hand, findings from the study revealed that only the threat appraisal would be a significant predictor for the fear control process. The result supported findings from prior studies that when individuals perceived a high-threat message that outweighed the perceived efficacy, they would shift from danger control to fear control (Shi & Smith, 2018). The results also supported existing literature that when people perceive high threat, they would be motivated to make additional appraisals instead of having no responses in the case of low threat (Maloney et al., 2011). As a result, perceived threat is confirmed as an important element that would strongly determine the outcomes of the behaviors.

In this case, it could be explained that “cancer” is viewed as a dangerous disease and is unlike any other types of sickness as it could strongly negatively impact lifestyles (Dunn et al., 2015). Consequently, it is a heavy topic and people could avoid discussing about it, thus ending up with the fear control process. This could be especially true in the case that a family does not already have a positive and open environment where the members feel comfortable talking about challenging topics with each other (Gafner, 2018). It could also be due to the lack of knowledge about colorectal cancer screening and how the procedure is done; in fact, many different types of tests have been offered nowadays instead of colonoscopy being the only option. Future campaigns should include more educational elements into the efficacy components so that it might increase the level of perceived efficacy, thus leading to better behavioral intention and turnout in screening rates.

The findings indicated that ethnicity in advertisements would significantly predict behavioral intention to discuss colorectal cancer with a parent. This is consistent with existing literature that diverse ethnic groups would react differently to advertising; for example, non-Hispanic African American adolescents had more trust in food advertising or ethnicity differed

the receptivity to protobacco media (Thai, Serrano, Yaroch, Nebeling, & Oh, 2017; Chen, Cruz, Schuster, Unger, & Johnson, 2002). This is also consistent with the understand that each race and ethnicity has different ethnic profiles and behave differently, and race and ethnicity are often used in health tailoring (Zhao et al., 2019). By targeting specific ethnic groups with particular relevant advertisements, health campaigns could potentially reach the optimal results when promoting colorectal cancer screening.

The current findings also support results from existing literature that ethnicity is a significant predictor of behavior. An existing study found that non- Caucasians were more likely to look up for information online about HPV due to racial minorities being less likely to be exposed to health information from other sources (Manika, Ball & Stout, 2014). It is important to note that ethnic and racial groups interact differently to campaign messages and it would be helpful to apply different communication strategies to each group. The findings are important as they could contribute to fill the gap of disparities in colorectal cancer screening for minorities with promotional health messages distributed through social media to reach this specific group of audience.

As stated previously, minorities are more likely to develop colorectal cancer with higher mortality rates (Jackson et al., 2016). With preventative screening being crucial in decreasing the incidence and mortality rates of colorectal cancer, advertisement ethnicity should be integrated greatly into preventative health campaign messages to optimize the efficiency of the message and potentially lead to a higher rate of engaging in the recommended behavior which is getting screened for colorectal cancer. This is a major contribution to the literature of colorectal cancer screening as limited literature has studied the messages across ethnic groups while it could be a significant predictor for behavioral intention. In addition, due to socioeconomics, many

minorities still have barriers to access to healthcare providers who would be the main source of screening recommendation (Jackson et al., 2016). The study by Jackson and colleagues (2016) have also found that educational interventions were effective in increasing colorectal cancer screening rates by 10-15%, and by including advertisement ethnicity, the audience could feel more relatable with the message while educating themselves of why such screening would be life-saving. As a result, integrating ethnicity advertisements could be helpful in increasing the exposure of the audience to the message and increase their awareness about the disease. In the past, ethnicity has been overlooked and was not studied while it plays a significant role in understanding colorectal cancer and what should be done to decrease the disparities in health of minorities. Additionally, results from the study also found that advertisement ethnicity featuring Latino/ Hispanics also significantly predicted fear control. This finding offers a new understanding about how each ethnic group has different perspectives and reactions to similar screening messages; thus gaining insights on how important it is to study colorectal cancer and screening in each group and how to strategically target each one instead of using a “one size fits all” message. The finding could also be applied to different fields of public health and not just in colorectal cancer screening.

The results also answered research question 1 and stated that the message type also significantly predicted behavioral intention to communicate colorectal cancer screening with a parent. Unlike previous studies on EPPM where different perceived threats and efficacy levels were manipulated (Gould et al., 2015), this study aimed to take a different direction and investigated the message appeal of logical and emotional instead. The findings from the study suggested that logical appeal message is more predictive of the behavior intention, which could be explained that the logical appeal message was more efficient in delivering the information that

resulted in the recommended behavior. This supported previous findings that factual information was more likely to be shared on Twitter compared to personal experiences (Zhang et al., 2019). This could be explained as while emotional appeal and personal narratives could evoke feelings in the audience, sometimes it is difficult to relate to the stories. In addition, with health-related information, people could find factual and logical information more credible, especially if it comes from reliable sources such as the American Cancer Society or the CDC, thus strengthening their beliefs in the message and evoking fears in them. This is an important finding as health professionals could gain insights into which message appeal would be more efficient and should be included in campaigns so that it would lead to an increase in preventative screenings.

Future studies should investigate in further explanation of why logical appeal and factual information would be more effectively in changing behaviors, and under which contexts and circumstances that the appeals could have different effects. With existing literature supporting personal narratives and emotional appeal messages being more efficient, it would be beneficial to find out more about the appeals. For example, different levels of logical and emotional messages could be manipulated to see whether a combination of the appeals could be efficient in leading to the recommended behaviors.

Social media has proven to be an effective tool in promoting healthcare and cancer prevention, as it can target different populations that traditional media can't reach (Neiger et al., 2012). With social media being such a popular tool among young adults, messages could be easily distributed to them as they are likely to see the information while using social media. Instead of focusing strictly on the audience with the risk factors of being 50 years old and above, using social media as a health platform to target young adults offers a wider scope of audience,

increasing the probability of the message getting exposed to the audience and thus also improving their awareness about colorectal cancer. For many people who have minimal access to healthcare, getting through to them through social media would be an alternative method of increasing their awareness on cancer screening, as social media is free to use and could be conveniently accessed at any locations and any time. This essentially would gradually close the gap of health and screening disparities between minorities and Caucasians. Using social media would help targeting minorities more efficiently while not letting socioeconomic becoming an impacting barrier. With features on social media such as paid advertisements on Facebook, health professionals and organizations could distribute information and messages about colorectal cancer screening while being able to specifically target the audience as needed, such as a particular age group or a geographically region that is normally hard to reach. Health professionals could utilize different features founded in this study to create a very efficient message, which includes high threat and high efficacy, logical appeals, and photos of ethnicity advertisement. This combination could potentially be useful in making the target audience increasing their behavior intention, thus successfully promoting colorectal cancer screening.

Family communication about health is also important as the children could also impact the parent's health behaviors. While there is no findings from the study indicated that targeting children about colorectal cancer screening so that they would discuss it with the parents would eventually lead to actual screening, this opens up a new channel for health professionals to communicate about colorectal cancer screening and how it is crucial in preventing the disease. As young adults usually have a better understanding and concern about health (Gafner, 2018), they could be the important messengers that relay the message about colorectal cancer screening to their parents. Family communication plays a potential role in impacting everyone's health

behaviors and construction of health (Bylund & Duck, 2004). As a result, more studies should be conducted to see how family communication about healthcare topics could impact decision making and how advertising to others has the potential to reach the target demographic through an indirect route. For example, a father may see advertisements regarding his health over and over but never make a change. Instead, the advertiser shifts focus to the other people in the father's life who would encourage a positive health decision that he might otherwise avoid. Whether he receives the message first-person and makes the change or someone in his life encourages him to do it, the advertising goal will have been reached: he decided to get a colorectal examination. This could also lead to lifelong health positivity for the individual that may not be immediately afflicted. More research could be done on this topic and how early exposure to colorectal health messages could lead to lifelong willingness to make good health choices for oneself.

By applying the EPPM in promoting colorectal cancer screening, the study has gained valuable insights into different message appeals that could be used to improve the efficiency of risk messages while supporting the concept that a high perceived threat and high perceived efficacy message would lead to a higher chance of the audience engaging in the recommended behaviors. In addition, the finding of the significant role of advertisement ethnicity has offered new understanding into the context and demonstrated how it should be coordinated more when it comes to health message designs with the efforts of narrowing health disparities between ethnic groups, specifically in colorectal cancer. The findings suggest that the EPPM is effective in communicating about health risk and different features should be combined to optimize the effect of the message.

CHAPTER SIX: LIMITATIONS AND FUTURE RESEARCH

While the population included different ethnicity, the study only focused on the four biggest ethnicity group including Caucasian, African American, Hispanics and Asian American. As a result, the study might not be generalizable as it does not necessarily represent the population. A more diverse sample should be used when investigating the importance of advertisement ethnicity. A larger sample size would also improve the quality of the study and could be more of a population representative.

The current study has set a foundation for further studies to understand more about different message components in EPPM. With that, there are several directions that future studies could take. For example, studies could examine that aside from a high threat and high efficacy combination, would there be any other combinations and contexts that could bring similar effects to the change in the behavior intention? This would offer health professionals more insights and options when designing health messages. Since EPPM has been used widely in many health campaigns, different combinations could be useful in engaging the audience instead of using the same high threat- high efficacy strategy. Colorectal cancer screening rate is still low, and it is crucial that health professionals could apply different EPPM approaches and strategies to influence the audience's behaviors.

Futures studies could also look into manipulating the competing fears. While the current study focusing on the fear of colorectal cancer, other studies could examine the fear of getting the colorectal cancer screening and exams. As stated previously, because some of the procedures are invasive, participants could feel fearful about it and a message reducing the threat element

could be helpful in easing the participants' minds and getting them screened. Other theories could be used here such as the loss and gain frame that is often used in health communication.

In addition, future studies should examine further into integrating educational materials into colorectal cancer screening preventative messages as the educational information could increase the perceived efficacy in the audience. Instead of just saying screening, more options could be presented so that the audience could see that colorectal cancer is highly preventable and that it is easy to take the tests. In addition, further research should be conducted in how and where the educational materials and messages should be placed depending on the audience's socioeconomics to optimize the effects of the messages, as they already have had barriers to access to healthcare providers. With socioeconomics playing such a huge role in the colorectal cancer rates, more studies should be conducted to determine how health professionals could help closing the disparities.

Another direction that future studies could look at is how races and ethnicities should be reflected in the context of colorectal cancer and screening. As mentioned above, this is an area that has been overlooked and more research needs to be conducted. Since the same advertisement can't feature all races, further research could be developed to see how should the race be determined to use in advertisements and how should messages be more inclusive to different races and enmities. With colorectal cancer seriously affecting minorities, it is important to learn how the gaps of colorectal screening could be narrowed.

Studies could also look into different social media platforms instead of just Facebook. With each platform being distinctive with its feature, further investigation could be done to see which type of message works the best on which platform. Twitter, for example, would be another potential platform to study with its unique limitations on characters and the popular use of

hashtags. In addition, future studies could manipulate different levels of logical and emotional message appeals, or even a combination of both appeals, and see how it could significantly affect the message acceptance for the audience. Research could also look at whether a type of message appeal works better with a specific group of demographics compared to other ones, and from there be able to optimize the components in a health preventative message. With both areas of colorectal cancer and EPPM have the promising potential to be explored, more studies should be conducted in these fields as they would contribute greatly to the health literature in cancer research.

REFERENCES

- American Cancer Society. (2020). Colorectal Cancer Facts & Figures 2020-2022. Retrieved from <https://www.cancer.org/research/cancer-facts-statistics/colorectal-cancer-facts-figures.html>
- American Cancer Society. (2020). Key Statistics for Colorectal Cancer. Retrieved from <https://www.cancer.org/cancer/colon-rectal-cancer/about/key-statistics.html>
- Arnold, M., Sierra, M. S., Laversanne, M., Soerjomataram, I., Jemal, A., & Bray, F. (2017). Global patterns and trends in colorectal cancer incidence and mortality. *Gut*, *66*(4), 683-691. Retrieved from <http://search.ebscohost.com.ezproxy.lib.usf.edu/login.aspx?direct=true&db=edsgao&AN=edsgcl.497628279&site=eds-live>
- Baiocchi-Wagner, E. A. (2015). Future Directions in Communication Research: Individual Health Behaviors and the Influence of Family Communication. *Health Communication*, *8*, 810-819.
- Baiocchi-Wagner, E., & Talley, A. (2013). The Role of Family Communication in Individual Health Attitudes and Behaviors Concerning Diet and Physical Activity. *Health Communication*, *28*(2), 193-205.
- Booth-Butterfield, M., & Sidelinger, R. (1998). The Influence of Family Communication on the College-Aged Child: Openness, Attitudes and Actions about Sex and Alcohol. *Communication Quarterly*, *3*, 295-308.
- Bylund, C. L., & Duck, S. (2004). The everyday interplay between family relationships and family members' health. *Journal of Social and Personal*, *1*, 5-7.
- Carmeli, A., Dranikoff, L., Kundu, A., & Ladabaum, U. (2020). The case for philanthropic investment to increase colorectal cancer screening rates: A novel paradigm to address a public health challenge. *Cancer Medicine*, *3*, 1220-1229.
- Centers for Disease Control and Prevention (2020, February 10). About the Screen for Life Campaign. Retrieved from <https://www.cdc.gov/cancer/colorectal/sfl/about.htm>
- Centers for Disease Control and Prevention (2020, February 10). Basic Information About Colorectal Cancer. Retrieved from https://www.cdc.gov/cancer/colorectal/basic_info/
- Centers for Disease Control and Prevention (2020, February 10). What Should I Know About Screening for Colorectal Cancer? Retrieved from https://www.cdc.gov/cancer/colorectal/basic_info/screening/index.htm

- Chen, L., & Yang, X. (2019). Using EPPM to Evaluate the Effectiveness of Fear Appeal Messages Across Different Media Outlets to Increase the Intention of Breast Self-Examination Among Chinese Women. *Health Communication, 11*, 1369-1376
- Chen, L., Yang, X., Fu, L., Liu, X., & Yuan, C. (2019). Using the Extended Parallel Process Model to Examine the Nature and Impact of Breast Cancer Prevention Information on Mobile-Based Social Media: Content Analysis. *Journal of Medical Internet Research mHealth and uHealth, 7*(6), e13987. <https://doi.org/10.2196/13987>
- Chen, X., Cruz, T. B., Schuster, D. V., Unger, J. B., & Johnson, C. A. (2002). Receptivity to Protobacco Media and Its Impact on Cigarette Smoking Among Ethnic Minority Youth in California. *Journal of Health Communications, 2*, 95.
- Chung, J. E. (2017). Retweeting in health promotion: Analysis of tweets about Breast Cancer Awareness Month. *Computers in Human Behavior, 74*, 112–119. <https://doi-org.ezproxy.lib.usf.edu/10.1016/j.chb.2017.04.025>
- Clement, J. (2020, April 30). Number of monthly active Facebook users worldwide as of 1st quarter 2020. Statista. Retrieved from <https://www.statista.com/statistics/264810/number-of-monthly-active-facebook-users-worldwide/>
- Cooper, C. P., Gelb, C. A., & Hawkins, N. A. (2014). How many “Get Screened” messages does it take? Evidence from colorectal cancer screening promotion in the United States, 2012. *Preventive Medicine, 60*, 27–32. <https://doi-org.ezproxy.lib.usf.edu/10.1016/j.ypmed.2013.12.001>
- DeSantis, C. E., Miller, K. D., Goding Sauer, A., Jemal, A., & Siegel, R. L. (2019). Cancer statistics for African Americans, 2019. *CA: A Cancer Journal for Clinicians, 69*(3), 211-233.
- Dunn, J., Birmingham, W. C., Hung, M., Boonyasiriwat, W., Kohlmann, W., Walters, S. T., Burt, R. W., Stroup, A. M., Edwards, S. L., Schwartz, M. D., Lowery, J. T., Hill, D. A., Wiggins, C. L., Higginbotham, J. C., Tang, P., Hon, S. D., Franklin, J. D., Vernon, S., & Kinney, A. Y. (2015). Effectiveness of the extended parallel process model in promoting colorectal cancer screening. *Psycho-Oncology, 10*, 1265-1278. <https://doi-org.ezproxy.lib.usf.edu/10.1002/pon.3899>
- Gafner, E. E. (2018). *Families Communicating About Health: Conceptualization and Validation of the Family Health Communication Quotient Scale*. [master’s thesis, Old Dominion University]. ODU Digital Commons.
- Gould, G. S., Watt, K., Cadet-James, Y., & Clough, A. R. (2015). Using the risk behaviour diagnosis scale to understand Australian Aboriginal smoking — A cross-sectional validation survey in regional New South Wales. *Preventive Medicine Reports, 2*(C), 4–9. <https://doi-org.ezproxy.lib.usf.edu/10.1016/j.pmedr.2014.10.004>

Gramlich, J. (2019, May 16). 10 facts about Americans and Facebook. Pew Research Center. Retrieved from <https://www.pewresearch.org/fact-tank/2019/05/16/facts-about-americans-and-facebook/>

Han, C. J., Lee, Y. J., & Demiris, G. (2018). Interventions using social media for cancer prevention and management: A systematic review. *Cancer Nursing*, 41(6), E19–E31. <https://doi-org.ezproxy.lib.usf.edu/10.1097/NCC.0000000000000534>

Heo, J., Chun, M., Lee, H. W., & Woo, J.-H. (2018). Social media use for cancer education at a community-based cancer center in South Korea. *Journal of Cancer Education*, 33(4), 769–773. <https://doi-org.ezproxy.lib.usf.edu/10.1007/s13187-016-1149-4>

Kaushal, A., Kassianos, A. P., Sheringham, J., Waller, J., & Wagner, C. von. (2020). Use of social media for cancer prevention and early diagnosis: scoping review protocol. *BMJ Open*, 10(2), 1-5.

Kim, M. & Choi, Y. (2017). Risk Communication: The Roles of Message Appeal and Coping Style. *Social Behavior & Personality: An International Journal*, 45(5), 773–784. <https://doi-org.ezproxy.lib.usf.edu/10.2224/sbp.6327>

Jackson, C. S., Oman, M., Patel, A. M., & Vega, K. J. (2016). Health disparities in colorectal cancer among racial and ethnic minorities in the United States. *Journal of Gastrointestinal Oncology*, 7, S32–S43. <https://doi-org.ezproxy.lib.usf.edu/10.3978/j.issn.2078-6891.2015.039>

Maloney, E. K., Lapinski, M. K., & Witte, K. (2011). Fear Appeals and Persuasion: A Review and Update of the Extended Parallel Process Model. *Social & Personality Psychology Compass*, 5(4), 206-219. Retrieved from <http://search.ebscohost.com.ezproxy.lib.usf.edu/login.aspx?direct=true&db=edb&AN=71688425&site=eds-live>

Manika, D., Ball, J. G., & Stout, P. A. (2014). Factors Associated with the Persuasiveness of Direct-to-Consumer Advertising on HPV Vaccination Among Young Women. *Journal of Health Communication*, 11, 1232.

Martin, K. (2017, January 22). The Extended Parallel Processing Model. Health Communication Capacity Collaborative. Retrieved from <https://healthcommcapacity.org/hc3resources/extended-parallel-processing-model-hc3-research-primer/>.

Morrison, L., Chen, C., Torres, J. S., Wehner, M., Junn, A., & Linos, E. (2019). Facebook advertising for cancer prevention: a pilot study. *British Journal of Dermatology*, 4, 858-859. <https://doi-org.ezproxy.lib.usf.edu/10.1111/bjd.17993>

Myrick, J. G. (2015). *The Role of Emotions in Preventative Health Communication*. Lexington Books.

- National Cancer Institute. (2019). Colorectal Cancer Screening (PDQ®)–Patient Version. Retrieved from <https://www.cancer.gov/types/colorectal/patient/colorectal-screening-pdq>
- National Colorectal Cancer Roundtable. (2018). 80% By 2018 Press Kit. Retrieved from <https://ncrt.org/resource/80-2018-press-kit/>
- Neiger, B. L., Thackeray, R., Van Wagenen, S. A., Hanson, C. L., West, J. H., Barnes, M. D., & Fagen, M.C. (2012). Use of Social Media in Health Promotion: Purposes, Key Performance Indicators, and Evaluation Metrics. *Health Promotion Practice, 13*(2), 159-164.
- Pellino, G., Simillis, C., Qiu, S., Rasheed, S., Mills, S., Warren, O., Kontovounisios, C., & Tekkis, P. P. (2017). Social media and colorectal cancer: A systematic review of available resources. *Plos one, 12* (8), e0183031. <https://doi.org/10.1371/journal.pone.0183031>
- Pew Research Center (2019, June 12). Social Media Fact Sheet. Retrieved from <https://www.pewresearch.org/internet/fact-sheet/social-media/>
- Popova, L. (2012). The Extended Parallel Process Model: Illuminating the Gaps in Research. *Health Education & Behavior, 39*(4), 455-473. Retrieved from <http://search.ebscohost.com.ezproxy.lib.usf.edu/login.aspx?direct=true&db=edsbl&AN=RN348269069&site=eds-live>
- Prochaska, J. J., Coughlin, S. S., & Lyons, E. J. (2017). Social Media and Mobile Technology for Cancer Prevention and Treatment. *American Society of Clinical Oncology educational book. American Society of Clinical Oncology. Annual Meeting, 37*, 128–137. https://doi.org/10.1200/EDBK_173841
- Ratogi, N., Xia, Y., Inadomi, J., Kwon, S. C., Trinh- Shervin, C., & Liang, S. P. (2019). Disparities in colorectal cancer screening in New York City: An analysis of the 2014 NYC Community Health Survey. *Cancer Medicine, 8*(5), 2572–2579. <https://doi-org.ezproxy.lib.usf.edu/10.1002/cam4.2084>
- Sarkar, U., Le, G. M., Lyles, C. R., Ramo, D., Linos, E., & Bibbins-Domingo, K. (2018). Using social media to target cancer prevention in young adults: Viewpoint. *Journal of Medical Internet Research, 20*(6).
- Sauer, A. G., Liu, B., Siegel, R. L., Jemal, A., & Fedewa, S. A. (2018). Comparing cancer screening estimates: Behavioral Risk Factor Surveillance System and National Health Interview Survey. *Preventive Medicine, 94*-100.
- Sheeran, P., Harris, P. R., & Epton, T. (2014). Does heightening risk appraisals change people's intentions and behavior? A meta-analysis of experimental studies. *Psychological Bulletin, 140*(2), 511–543. <https://doi-org.ezproxy.lib.usf.edu/10.1037/a0033065>

- Shi, J. (Jolie), & Smith, S. W. (2016). The effects of fear appeal message repetition on perceived threat, perceived efficacy, and behavioral intention in the extended parallel process model. *Health Communication, 31*(3), 275-286.
- Simon K. (2016). Colorectal cancer development and advances in screening. *Clinical interventions in aging, 1*, 967–976. <https://doi.org/10.2147/CIA.S109285>
- Termeh Zonouzy, V., Niknami, S., Ghofranipour, F., & Montazeri, A. (2018). An educational intervention based on the extended parallel process model to improve attitude, behavioral intention, and early breast cancer diagnosis: a randomized trial. *International Journal of Women's Health, ume 11*, 1–10.
- Thai, C. L., Serrano, K. J., Yaroch, A. L., Nebeling, L., & Oh, A. (2017). Perceptions of Food Advertising and Association With Consumption of Energy-Dense Nutrient-Poor Foods Among Adolescents in the United States: Results From a National Survey. *Journal of Health Communication, 8*, 638.
- Willoughby, J. F., & Myrick, J. G. (2019). Entertainment, Social Media Use and Young Women's Tanning Behaviours. *Health Education Journal, 78*(3), 352–365.
- Witte, K. (1992). Putting the fear back into fear appeals: The extended parallel process model. *Communication Monographs, 59*, 329-349. doi:10.1080/03637759209376276
- Witte, K., & Allen, M. (2000). A Meta-Analysis of Fear Appeals: Implications for Effective Public Health Campaigns. *Health Education and Behavior, 5*, 591-615.
- Witte, K., Martell, D., & Meyer, G. (2001). What are Health Risk Messages. In M. H. Seawell & C. A. Hoffman (Eds.), *Effective Health Risk Messages: A Step-By-Step Guide* (pp. 1-10). SAGE Publications, Inc.
- Witte, K., Martell, D., & Meyer, G. (2001). The Risk Behavior Diagnosis Scale. In M. H. Seawell & C. A. Hoffman (Eds.), *Effective Health Risk Messages: A Step-By-Step Guide* (pp. 67-76). SAGE Publications, Inc.
- Wolf, A. M. D., Fontham, E. T. H., Church, T. R., Flowers, C. R., Guerra, C. E., LaMonte, S. J., Etzioni, R., McKenna, M. T., Oeffinger, K. C., Shih, Y. T., Walter, L. C., Andrews, K. S., Brawley, O. W., Brooks, D., Fedewa, S. A., Manassaram, B. D., Siegel, R. L., Wender, R. C., Smith, R. A., & Shih, Y.-C. T. (2018). Colorectal cancer screening for average-risk adults: 2018 guideline update from the American Cancer Society. *CA: A Cancer Journal for Clinicians, 68*(4), 250–281. <https://doi-org.ezproxy.lib.usf.edu/10.3322/caac.21457>
- Ye, D., Huang, Q., Li, Q., Jiang, X., Mamat, M., Tang, M., Wang, J., & Chen, K. (2017). Comparative Evaluation of Preliminary Screening Methods for Colorectal Cancer in a Mass Program. *Digestive Diseases and Sciences, 9*, 2532.

- Zhang, J., Le, G., Larochele, D., Pasick, R., Sawaya, G. F., Sarkar, U., & Centola, D. (2019). Facts or stories? How to use social media for cervical cancer prevention: A multi-method study of the effects of sender type and content type on increased message sharing. *Preventive Medicine, 126*. <https://doi-org.ezproxy.lib.usf.edu/10.1016/j.ypmed.2019.105751>
- Zhao, X., Yang, B., & Wong, C.-W. (2019). Analyzing Trend for U.S. Immigrants' e-Health Engagement from 2008 to 2013. *Health Communication, 11*, 1259.

APPENDICES

Appendix 1: EPPM

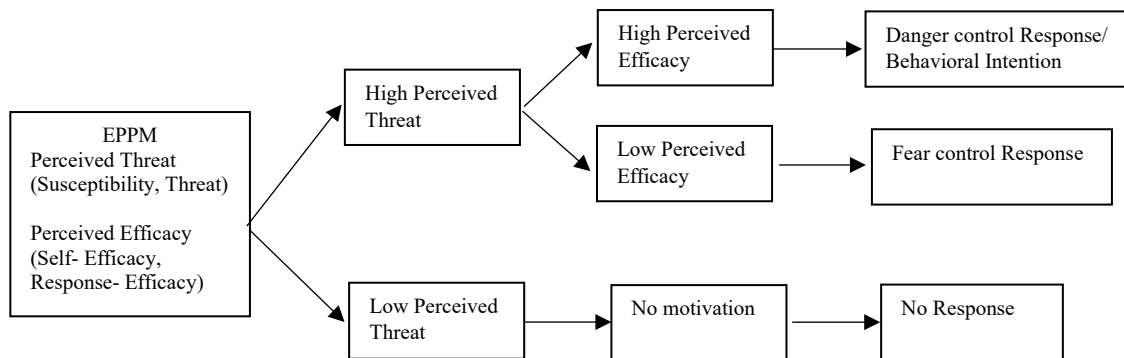


Figure 1. The components of EPPM

Appendix 2: Messages Used in Study

1. African/ American female with Mom - emotional



If your parents are 50 and older, make sure they are up-to-date on their colorectal cancer screening.

Early detection saves lives. You still have a lot of memories to make with your parents. Talk to your parents about colorectal cancer screening so that you can enjoy more tomorrows.

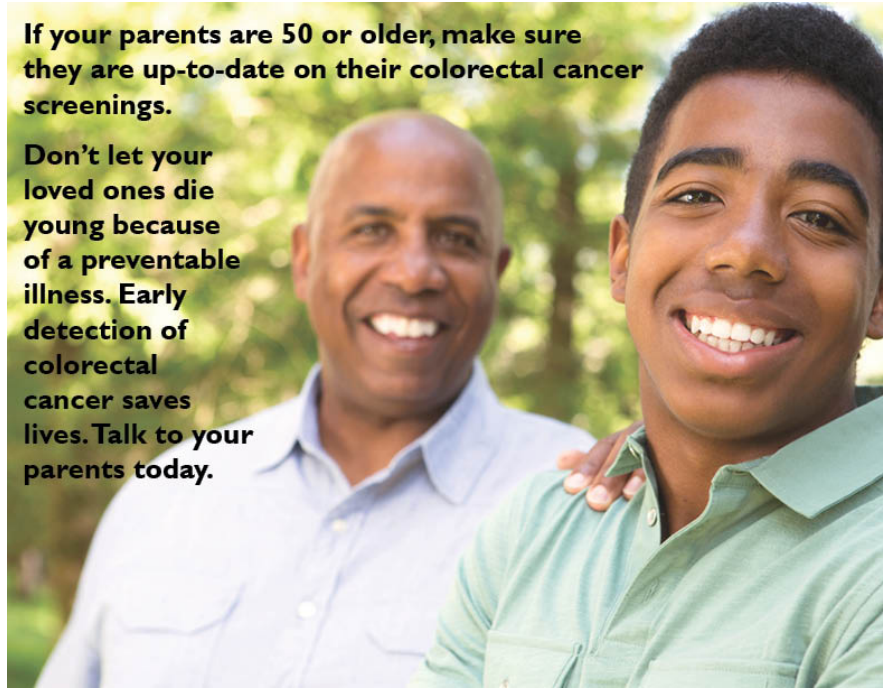
2. African/ American female with Mom – logical



If your parents are 50 and older, make sure they are up-to-date on their colorectal cancer screening.

Age is the #1 risk factor for colorectal cancer - 90% of cases appear in men and women ages 50 and older.

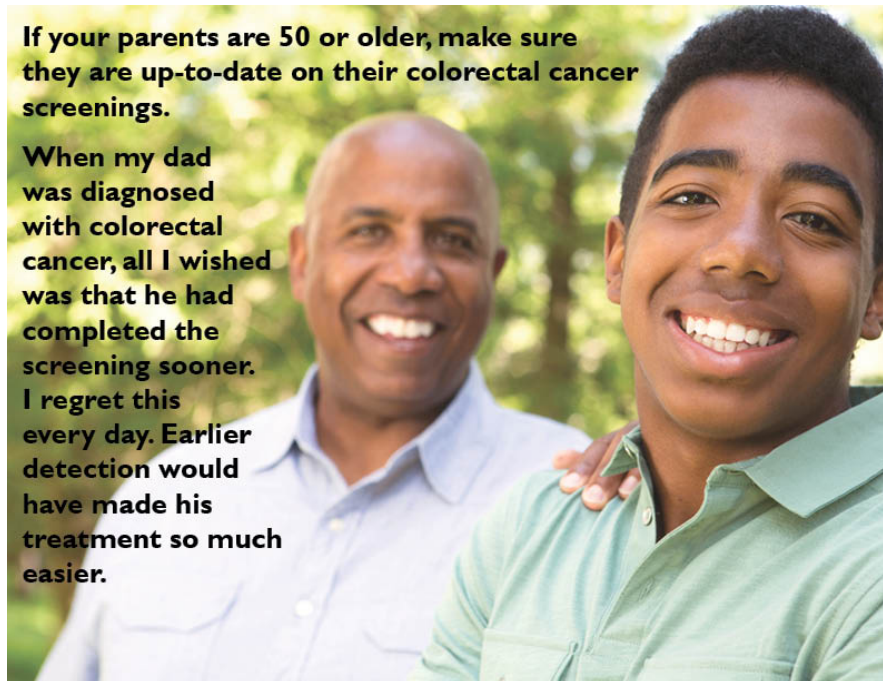
3. African/ American male with Dad – emotional



If your parents are 50 or older, make sure they are up-to-date on their colorectal cancer screenings.

Don't let your loved ones die young because of a preventable illness. Early detection of colorectal cancer saves lives. Talk to your parents today.

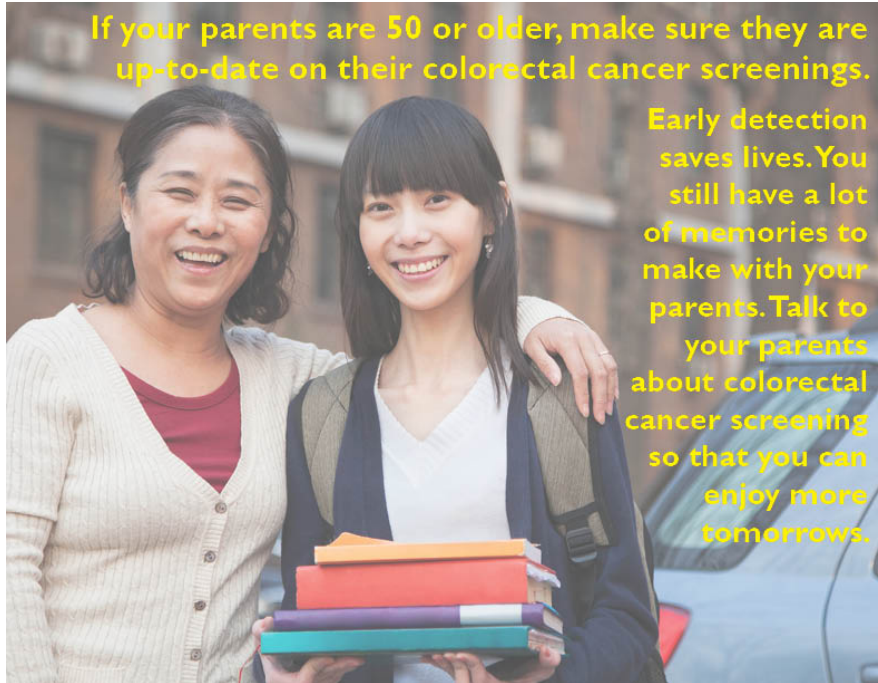
4. African/ American male with Dad – logical



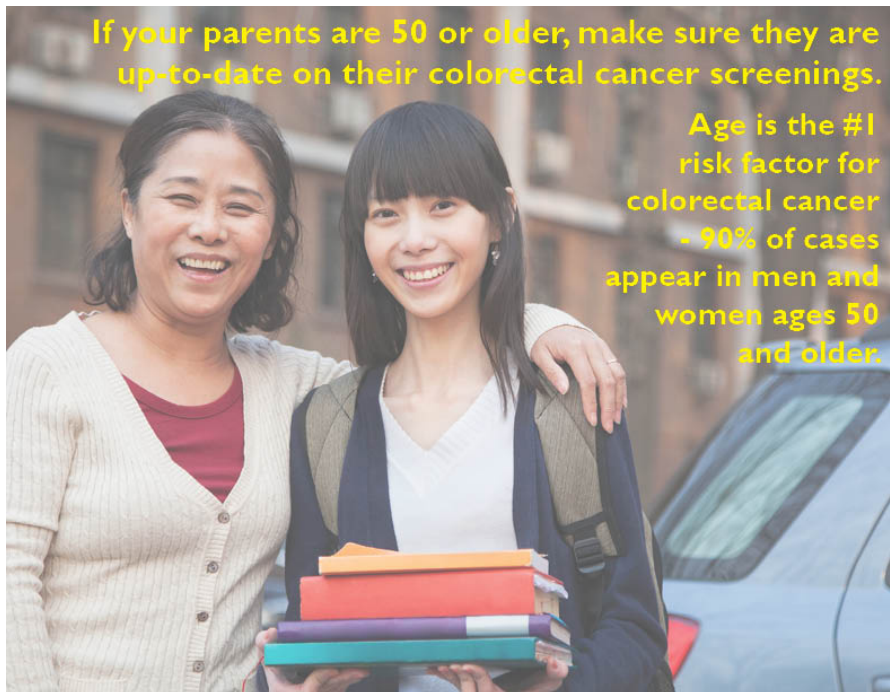
If your parents are 50 or older, make sure they are up-to-date on their colorectal cancer screenings.

When my dad was diagnosed with colorectal cancer, all I wished was that he had completed the screening sooner. I regret this every day. Earlier detection would have made his treatment so much easier.

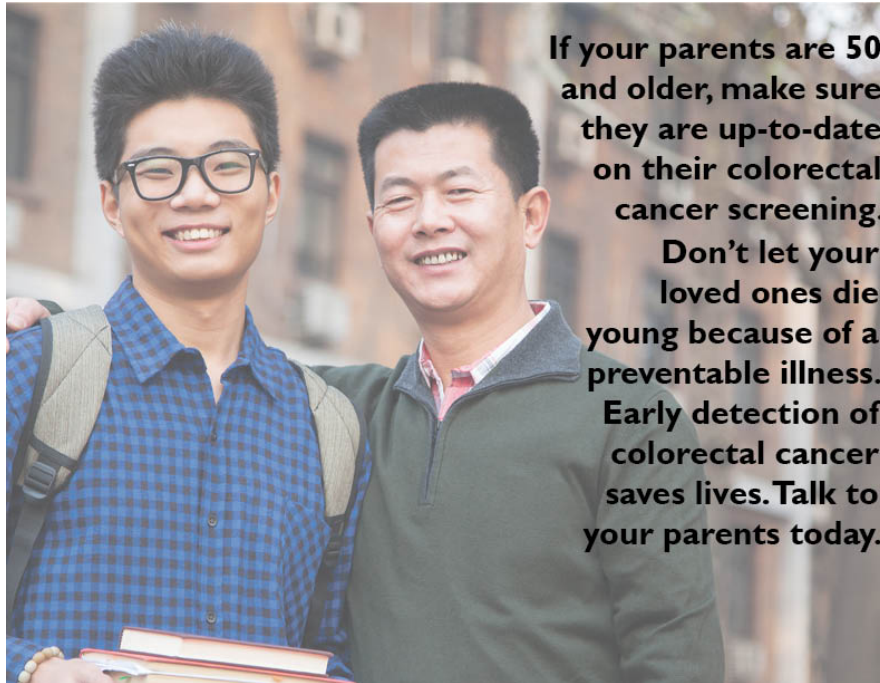
5. Asian Female with Mom – emotional



6. Asian Female with Mom – logical

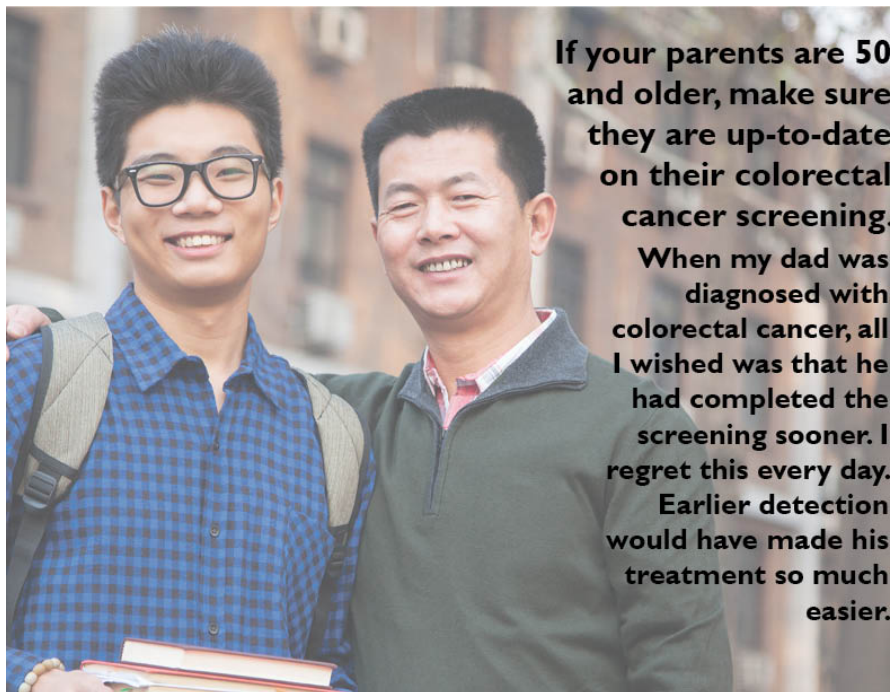


7. Asian Male with Dad - Emotional



If your parents are 50 and older, make sure they are up-to-date on their colorectal cancer screening. Don't let your loved ones die young because of a preventable illness. Early detection of colorectal cancer saves lives. Talk to your parents today.

8. Asian Male with Dad – Logical



If your parents are 50 and older, make sure they are up-to-date on their colorectal cancer screening. When my dad was diagnosed with colorectal cancer, all I wished was that he had completed the screening sooner. I regret this every day. Earlier detection would have made his treatment so much easier.

9. Hispanic Female with Mom – Emotional

If your parents are 50 or older, make sure they are up-to-date on their colorectal cancer screenings.



Don't let your loved ones die young because of a preventable illness. Early detection of colorectal cancer saves lives. Talk to your parents today.

10. Hispanic Female with Mom- Logical

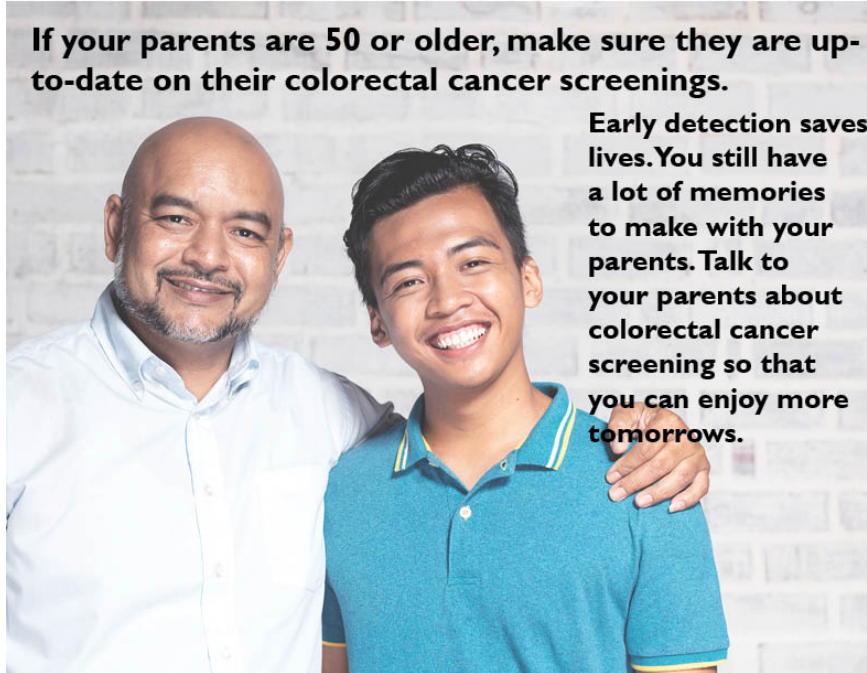
If your parents are 50 or older, make sure they are up-to-date on their colorectal cancer screenings.



When my mom was diagnosed with colorectal cancer, all I wished was that she had completed the screening sooner. I regret this every day. Earlier detection would have made her treatment so much easier.

11. Hispanic Male with Dad – Emotional

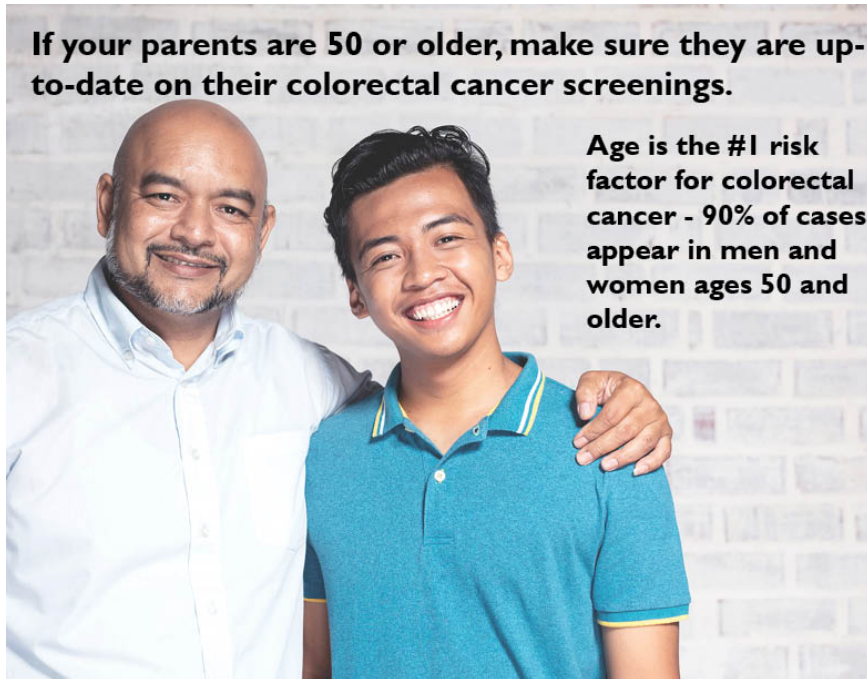
If your parents are 50 or older, make sure they are up-to-date on their colorectal cancer screenings.



Early detection saves lives. You still have a lot of memories to make with your parents. Talk to your parents about colorectal cancer screening so that you can enjoy more tomorrows.

12. Hispanic Male with Dad – Logical

If your parents are 50 or older, make sure they are up-to-date on their colorectal cancer screenings.



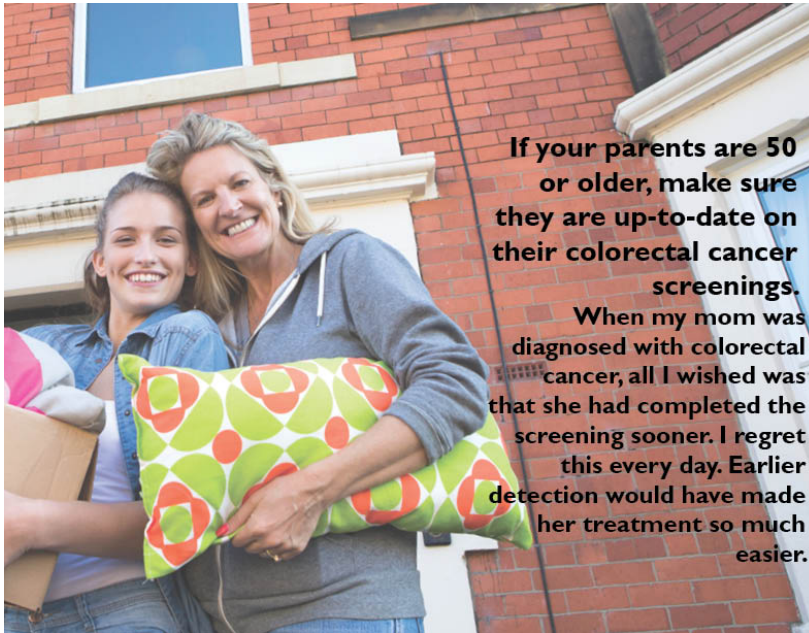
Age is the #1 risk factor for colorectal cancer - 90% of cases appear in men and women ages 50 and older.

13. White Female with Mom – Emotional



If your parents are 50 or older, make sure they are up-to-date on their colorectal cancer screenings. Don't let your loved ones die young because of a preventable illness. Early detection of colorectal cancer saves lives. Talk to your parents today.

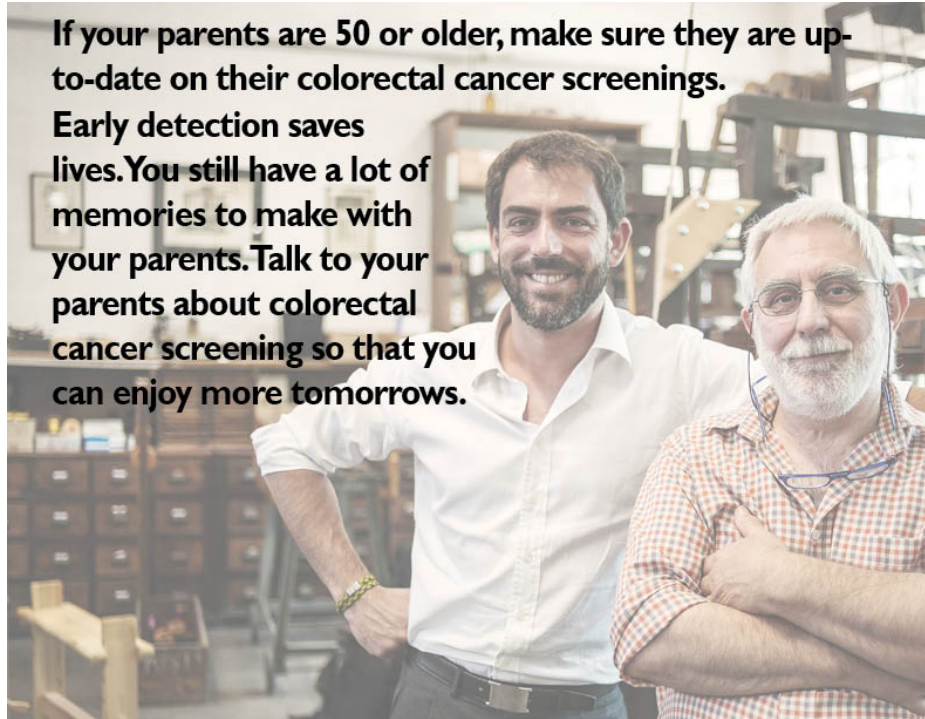
14. White Female with Mom – Logical



If your parents are 50 or older, make sure they are up-to-date on their colorectal cancer screenings. When my mom was diagnosed with colorectal cancer, all I wished was that she had completed the screening sooner. I regret this every day. Earlier detection would have made her treatment so much easier.

15. White Male with Dad – Emotional

If your parents are 50 or older, make sure they are up-to-date on their colorectal cancer screenings. Early detection saves lives. You still have a lot of memories to make with your parents. Talk to your parents about colorectal cancer screening so that you can enjoy more tomorrows.



16. White Male with Dad – Logical

If your parents are 50 or older, make sure they are up-to-date on their colorectal cancer screenings. Age is the #1 risk factor for colorectal cancer - 90% of cases appear in men and women ages 50 and older.



Appendix 3: EPPM Measures

Susceptibility:

1. The ad shows that my parent(s) is at risk for experiencing colorectal cancer
2. After viewing the ad, I think it is possible my parent(s) will experience colorectal cancer.
3. The ad shows that my parent(s) is susceptible to experiencing colorectal cancer.

Severity

1. The ad shows that colorectal cancer is a serious threat.
2. The ad shows that colorectal cancer is harmful.
3. The ad shows that the health effects of colorectal cancer are of serious concern.

Self- Efficacy

1. According to the ad, it is easy for colorectal cancer screening to prevent colorectal cancer.
2. My parent(s) is able to get a colorectal cancer screening easily.
3. I'm confident that I can persuade my parent(s) to have a colorectal cancer screening.

Response- Efficacy

1. According to the ad, performing colorectal cancer screening is an effective way to prevent colorectal cancer.
2. The ad shows that performing colorectal cancer screening is effective in getting rid of colorectal cancer.
3. The ad shows that colorectal cancer screening helps avoid colorectal cancer.

In addition to the EPPM measures, the survey asked questions that would measure the participants' behavioral intention.

Behavioral Intention:

1. I intend to discuss colorectal cancer screening with my parent(s).
2. I will talk to my parent(s) about having colorectal cancer screening.
3. I plan to ask my parent(s) about colorectal cancer screening.

Fear Control:

1. When I see the ads about colorectal cancer screening, I tend to avoid the thought about colorectal cancer screening.

Appendix 4: IRB Approval



RESEARCH INTEGRITY AND COMPLIANCE
Institutional Review Boards, FWA No. 00001669
12901 Bruce B. Downs Blvd., MDC035 • Tampa, FL 33612-4799
(813) 974-5638 • FAX(813)974-7091

May 24, 2019

Anh Nguyen
Zimmerman School of Advertising and Mass Communications
4210 E. Fletcher Ave B-222
Tampa, FL 33613

RE: **Exempt Certification**

IRB#: Pro00038981

Title: The Effect of Different Facebook Advertising Appeals and Colorectal Cancer Screening

Dear Ms. Nguyen:

On 5/24/2019, the Institutional Review Board (IRB) determined that your research meets criteria for exemption from the federal regulations as outlined by 45 CFR 46.104(d):

(2) Research that only includes interactions involving educational tests(cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures, or observation of public behavior (including visual or auditory recording) if at least one of the following criteria is met:(i) The information obtained is recorded by the investigator in such a manner that the identity of the human subjects cannot readily be ascertained, directly or through identifiers linked to the subjects; (ii) Any disclosure of the human subjects' responses outside the research would not reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, educational advancement, or reputation; or (iii) The information obtained is recorded by the investigator in such a manner that the identity of the human subjects can readily be ascertained, directly or through identifiers linked to the subjects, and an IRB conducts a limited IRB review to make the determination required by 45 CFR 46.111(a)(7).

As the principal investigator for this study, it is your responsibility to ensure that this research is conducted as outlined in your application and consistent with the ethical principles outlined in the Belmont Report and with USF HRPP policies and procedures.

Please note, as per USF HRPP Policy, once the exempt determination is made, the application is closed in ARC. This does not limit your ability to conduct the research. Any proposed or

anticipated change to the study design that was previously declared exempt from IRB oversight must be submitted to the IRB as a new study prior to initiation of the change. However, administrative changes, including changes in research personnel, do not warrant an Amendment or new application.

We appreciate your dedication to the ethical conduct of human subjects research at the University of South Florida and your continued commitment to human research protections. If you have any questions regarding this matter, please call 813-974-5638.

Sincerely,

A handwritten signature in blue ink, reading "Melissa Sloan". The signature is written in a cursive style with a large, sweeping loop at the top.

Melissa Sloan, PhD, Vice
Chairperson USF Institutional
Review Board