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AN EXTENSION OF THE EXTENDED PARALLEL PROCESS MODEL (EPPM) TO PROMOTE HEALTHY HEART BEHAVIORS

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AN EXTENSION OF THE EXTENDED PARALLEL PROCESS MODEL (EPPM)
TO PROMOTE HEALTHY HEART BEHAVIORS

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To my mom and dad. I love you.

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Abstract

The purpose of the current research was to extend the Extended Parallel Model (EPPM) by adding the variable of barrier from Health Belief Model (HBM) to EPPM. The study explored the role of threat, efficacy, and barrier on participants' attitudes and intentions towards exercising and eating a healthy diet for their heart health.

A 2(threat)x 2(efficacy)x 2(barrier) x2(message replication) mixed factorial design experiment was conducted online via Amazon MTurk. The threat x efficacy x barrier was a between-subject design whereas message replication was within subject design. The stimuli messages were narratives about exercise and healthy diet behaviors.

The result showed that there was a statistically significant main effect of barrier on participants' perceived self-efficacy regarding exercise behavior but not for healthy diet behavior. As hypothesized the participants who read a message that addressed the barrier of time to exercising reported higher self-efficacy about exercising than the participants who read a message that did not address the barrier. Although a significant interaction between threat and efficacy was found on attitudes towards healthy diet behavior, the interaction was not in the predicted direction. No interaction between threat and efficacy was found on attitude towards exercise. Also, no interaction between threat and efficacy was found on intention to exercise or eat a healthy diet. A marginally significant effect of efficacy was found on attitude toward exercise, where participants who read a high efficacy message had more positive attitudes towards exercise than the participants who read a low efficacy message. The study found no interaction between threat and barrier on perceived self-efficacy, attitude, intention for either exercising or healthy eating behaviors. However, there was a marginally significant main effect of

barrier on intention to exercise. Participants who read a message that addressed the barrier of time to exercise reported higher intentions to exercise than those who read a message that did not address the barrier. No three-way interaction of threat, efficacy, and barrier was found on attitude or intention to either exercise or eat a healthy diet. However, an interaction between efficacy and barrier on participants' attitudes toward exercise was found. The result showed that participants who read a high efficacy message that did not address the barrier had the most positive attitude toward exercise followed by those who read a low efficacy message that address the barrier. This is an important finding suggesting that it is not necessary to address the barrier when the message efficacy is high.

The study used narratives as message stimuli and found that the participants tend to identify themselves more with the characters in the high efficacy message conditions than the low efficacy message conditions.

The findings suggest that addressing an individual's perceived barrier regarding a health behavior may lead to an increase in their self-confidence about their ability to follow the recommended action. Some interactions of barrier with threat and efficacy on outcome variables were also found. These findings indicate that adding the concept of barrier to EPPM may increase the persuasiveness of the model. Future research should explore this extension of EPPM in other health behaviors to better understand how the variables threat, efficacy, and barrier work independently and interact with each other to influence individuals' health decision making.

Chapter 1: Introduction

Heart disease is a leading cause of death for both men and women in the USA. Based on reports from the Center for Disease Control (CDC) (2017), about 610,000 people die of heart disease in the United States every year. An estimated 92.1 million U.S. adults have at least one type of Cardiovascular Disease (CVD) (Writing Group Members et al., 2017). CVD is a heart and blood vessel disease, which is also commonly known as heart disease. CVD includes various problems that may be related to a process known as atherosclerosis, which is a condition developed from the substance called plaque that builds up in the walls of the arteries. This buildup of plaque results in narrowing the arteries and making it harder for blood to flow through.

The AHA recommends physical exercise, healthy diet, and smoking cessation for a healthy heart ("The American Heart Association's Diet," 2017). Although there was a decrease in age-adjusted rate for heart failure related deaths from 2000 through 2012, it increased from 2012 through 2014. Heart disease is a major public health problem that has increased despite advancements in technologies and treatment. Cognitive-behavioral strategies such as goal setting, self-monitoring, feedback and reinforcement, incentives, self-efficacy enhancement, relapse prevention, and motivational interviewing have been found to be effective in promoting behavior change among participants (Artinian et al., 2010). According to the National Heart, Blood and Lung Institute (2017) the at-risk population for heart disease includes smokers, those with high blood cholesterol and high triglyceride levels, the ones with diabetes and pre-diabetes, and overweight and obese people.

The AHA has listed physical inactivity as an independent risk factor for CVD. This means that an inactive person has a higher risk of developing CVD than an active person regardless of smoking status, family history, and other related diseases (Berlin & Colditz, 1990). The AHA recommends 150 minutes of moderate physical activity per week. The moderate physical exercise equals to 3.2 km or 2 mile walk (Marcus, King, Clark, Pinto, & Bock, 1996). Even low levels of physical activities such as brisk walking for 75 minutes per week have been associated with reduced risk of mortality in comparison to participants who are involved in no physical activities at all (Benjamin et al., 2017).

Various studies have examined the relationship between CVD and physical exercise. Studies have found that physical exercise such as walking, running, and aerobics reduce the risk of cardiovascular disease among the population of all ages (Boone-Heinonen, Evenson, Taber, & Gordon-Larsen, 2009; Lee, Pate, Lavie, Sui, Church, & Blair, 2014; Olanrewaju, Kelly, Cowan, Brayne, & Lafortune, 2016; Soares-Miranda, Siscovick, Psaty, Longsterth, & Mozaffarain, 2015). In order to have better heart health and better health overall, it is essential for individuals to be involved in physical activities (Ekelund, Steene-Johannessen, Brown, Fagerland, Owen, Powell, ... & Lancet Sedentary Behaviour Working Group, 2016; Myers, McAuley, Lavie, Despres, Arena, & Kokkinos, 2015).

Health communication scholars have used various theories to explore and understand how individuals can be encouraged to be involved in physical activities in order to have better health (Latimer, Brawley, & Bassett, 2010; Lustria, Noar, Cortese, Van Stee, Glueckauf, & Lee, 2013; Noar, Grant Harrington, Van Stee, & Shemanski

Aldrich, 2011). Health communication scholars have been using different theories and models to design health messages for persuasion such as theory of planned behavior (Ajzen, 1980), health belief model (HBM) (Rosenstock, 1966), social cognitive theory (Bandura, 1986), prospect theory (Kahneman & Tversky, 1992), and the extended parallel process model (EPPM) (Witte, 1992).

Among the theories used by the scholars, HBM and EPPM are fear appeal theories. Fear appeal have been defined in terms of the gruesome content such as pictures of severely damaged lung or the use of vivid language such as "thick purulent, choking secretions welled into the tracheotomy wound" (Leventhal, 1965; Witte, 1992). Fear appeals can also be defined in terms of amount of fear experienced by audience, both physiologically and psychologically, which is usually evaluated by a manipulation check where a high appeal yields significantly greater levels of reported or aroused fear than low fear appeal (Witte, 1992). However, it should be noted that these definitions of fear appeals are more about a perceived fear than the message content. Scholars have argued that fear appeal message should be defined as message attributes as well and not just as perception of fear (Dillard, 1994; Leshner, Bolls & Almond (2012); Leshner, Bolls & Wise, 2011; O'Keefe, 2003). Fear appeal messages have been conceptualized as message that "directly associates the targeted behavior (e.g., tobacco use) with a threat (e.g., disease, death)" (Leshner et al., 2011, p. 79). For example, a high-threat message in an anti-smoking ad can associate smoking with a severe impact such as lung cancer or death and a low threat message can associate smoking with less severe impact such as coughing. This conceptualization of fear appeals has led to the use of term health threat (Dillard, 1994). Meta-analyses of fear appeal messages have found that

manipulations of fear appeals in a message produced different levels of fears (Boster & Mongeau, 1984). The meta-analyses have also suggested that as the fear appeals become stronger in a message it results in the greater attitudes, intentions, and behavior changes (Boster & Mongeau, 1984; Mongeau, 1998; Witte & Allen, 2000). Therefore, using fear appeal theories such as EPPM and HBM to encourage physical activity for better heart health can be useful for health message designers to design better health message campaigns.

The purpose of this study is to extend the EPPM by adding the variable of perceived barrier from HBM. The goal is to persuade participants to take part in the regular physical exercise and consume better diet for a better heart health.

In the next section, the study first reviews the literature on the fear appeal theories, EPPM and HBM. Then the rationale for extension of the EPPM will be provided. The study also reviews literature on the perceived barriers in health behaviors to understand what types of barriers are commonly listed by the participants. The literature review paves the way for the hypotheses to be tested in the study.

Chapter 2: Literature Review

Extended Parallel Process Model (EPPM)

The Extended Parallel Process Model (EPPM) developed by Witte (1992) is a fear appeal theory. Some of the core constructs of fear appeals are fear, threat, and efficacy. Fear has been defined as a negative emotion that may be expressed physiologically through arousal, or psychologically through language, behaviors, or thoughts (Witte, 1992). When a person perceives a threat message as significantly and personally relevant, it leads to the arousal of fear (Easterling & Laventhal, 1989; Lang, 1984; Ortony & Turner, 1990). Research has found that a high fear message yields higher fear, in self-report as well as physiologically, such as accelerated heart rate and greater skin conductance than low fear message (Mewborn & Rogers, 1979).

The EPPM is based on parallel process model by Leventhal (1970) and Roger's original Protection Motivation Theory (PMT). The parallel process model focused on the cognitive processes rather than the emotional processes (Witte, 1992). The model claimed that when people were exposed to a threatening message they had the tendency to control the danger or threat, which is a cognitive process. When people are motivated to control the fear that is an emotional process, which is the fear control process (Leventhal, 1970). Witte (1992) argued that Leventhal (1970) included explanation of the circumstances that may lead to danger control or fear control processes, but failed to specifically point out when one process may dominate the other or what elements cause different processes. Another theory of fear appeal, PMT (Rogers, 1975) focuses on danger control process, which refers to the thoughts about how to avoid a danger. The model, however, fails to address the fear control process. The four message components

that lead to cognitive mediation processes include perceived susceptibility, perceived severity, perceived response efficacy, and perceived self-efficacy (Rogers, 1975). According to PMT, the cognitive mediation processes then leads to protection motivation. Protection motivation has been defined as "an intervening variable that has the typical characteristics of a motive: it arouses, sustains, and directs activity" (Rogers, 1975, p. 98). Protection motivation has been operationalized as behavioral intention (Rogers, 1983; Rainear & Christensen, 2017). Witte (1992) criticized that the model lacked the explanation of the factors that lead to message rejection.

Witte (1992) developed EPPM with an aim to put fear back into fear appeal theory. The EPPM describes the process of what happens when an individual gets exposed to a fear appeal including the components of threat (i.e., severity and susceptibility) and components of efficacy (i.e., response efficacy and self-efficacy). According to EPPM, when an individual gets exposed to a fear appeal then two appraisals are initiated (Witte, 1992; Witte 1994). If the appraisal of threat leads to moderate to high perceived threat in the individual, then it stimulates fear that motivates the individual to start the second appraisal (Witte, 1992). The second appraisal is the assessment of the efficacy of the recommended response. When the individual perceives that the threat is low, then there is no motivation to further process the message. When both the perceived threat and perceived efficacy are high, they lead to the danger control process. When the individual perceives that the threat is high and the actions recommended in the message are effective, and they are capable of performing the actions, then the danger control process is initiated. This leads to the individual responding to the danger and not the fear. But on the other hand, when the threat is high

but individual is not convinced that the message recommendations are effective or they are not capable of successfully deterring the threat, then it intensifies the fear. This then leads to defensive motivation through ignoring the message or denying that the threat exists (Witte, 1992). The feedback loop in the model signifies that fear may add to the motivation to process the message when it is appraised cognitively. When a person thinks about the threatening message, this can first make the person experience fear that can lead the person to upgrade their estimate of threat. The individual differences such as previous experience, culture, personality, and personal characteristics influence how people will perceive a threat message (Witte, 1992).

The EPPM has been widely used as a fear appeal theory in health communication since it was developed by Witte (1992). The model has been used to study and predict how health messages are processed to follow the recommended actions regarding different health behaviors. The EPPM has been used as a framework in research studies of various health issues such as cardiovascular diseases, hygienic behavior, public health emergency response, teen pregnancy, smoking, vaccination, and HIV/AIDS, among others (Carcioppolo et al., 2013; McKay, Berkowitz, Blumberg, & Goldberg, 2004; Slonim et al., 2005; Witte, 1997; Witte, Girma & Girgre, 2002).

A study by Carcioppolo et al. (2013) investigated the relationship between threat and efficacy on college age females' intentions to vaccine for Human Papillomavirus (HPV). The study compared if different ratio of threat and efficacy in a message than the standard EPPM message of one threat and one efficacy component is more effective in persuasion. The results showed that no other message ratio performed as good as the standard EPPM, which indicates that the threat and efficacy level as

suggested in EPPM is effective in persuading individuals to follow the recommended actions.

A study by McKay and Berkowitz (2004) found that participants who read a high threat message about the negative effects of cardiovascular disease reported that the recommended action can be effective in lowering the threat. The study also found that participants who read the high threat and high efficacy message had an increase in the attitudes and behavioral intentions to comply with the recommendations.

Health Belief Model

The Health Belief Model was developed in the 1950s to explain and predict preventive health behavior (Hochbaum, Kegels & Rosenstock, 1952). The model was developed in an era that public health care was mostly focused on preventing people from getting diseases rather than treating a health condition. However, with time the model has been used to explain and predict various health behaviors, both preventive and treatment (Hochbaum et al., 1952).

The HBM has been utilized by health scholars to understand and predict different health behaviors ranging from healthy diet, influenza vaccination, breast self-examination (BSE), mammography screening, and oral hygiene, weight management interventions among others (Becker, Maiman, Kirscht, Haefner & Drachman, 1977; Blue & Valley, 2002; Champion, 1990; Hyman, Baker, Ephraim, Moadel, & Philip 1994; Kühner & Raetzke 1989; McAruthur, Riggs, Uribe, & Spaulding, 2018). The studies have found support for some or all of the HBM variables in the predicted direction. A study by Hyman (1994) found that perceived benefits and perceived barriers were related to the use of mammographic screening, but no support for

perceived susceptibility was found. Another study by Champion (1990) found that susceptibility and benefits were significantly related to the frequency of breast self examination in women 35 and older. The perception of barriers was positively related to infrequent practitioners of BSE.

A recent study tested the predictive power of the HBM for body mass index (BMI) (McAruthur et al., 2018). The study found that there was a significant inverse relationship between perceived severity of overweight and BMI among college students. Those students majoring in health related disciplines had lower perceptions of barriers to eating healthy and physical activities and higher perceptions of benefits of such behaviors. However, there was also a significant positive relationship between perceived benefits of eating healthy and physical exercise and BMI. Cues to action from external sources were significantly and inversely related to students' BMIs. The study mostly found support for the HBM model to predict the healthy eating and physical activities of college students for a healthy weight (McArthur, 2018).

According to the HBM, an individual must first perceive that there is a threat to their health, and the person should simultaneously be cued to action. After that the individual should perceive that the perceived benefits of the action outweigh the perceived barriers that leads the person to follow the recommended action (Hochbaum et al., 1952). There are six constructs in HBM, which include perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action, and self-efficacy. Similarly, perceived susceptibility, perceived severity, and self-efficacy are the constructs common to EPPM (Austin et al., 2002).

In the HBM, cues to action act as the trigger to take the necessary action (Rosenstock, 1974). The cues can either be internal such as perception of bodily states or external such as the information received from the media and the interpersonal communication (Rosenstock, 1974). Individuals are motivated to take recommended action regarding a health behavior through different factors such as health motivation, threat-value perception of a particular disease, and the perception of usefulness of a particular health behavior for lowering that threat (Becker, 1974; Becker, Maiman, Kirscht, Haefner & Drachman, 1977; Mirotznik, Feldman & Stein, 1995).

Key Concepts of EPPM and HBM

Threat

In EPPM, a threat component of a message is characterized by the severity of threat (e.g., "Smoking causes cancer") and the individual's susceptibility to the threat (e.g., "You're at risk for cancer because you smoke everyday") (Witte, 1992). Perceived severity refers to an individual's belief about the seriousness of the threat. For example, if a smoker sees a public service announcement that says, "Smoking causes cancer," then the perceived severity of the message depends on the individual's belief on the severity of the threat. The message that states that smoking causes cancer can be a greater threat than if the message states "Smoking results in coughing," which may be evaluated as a lesser threat. Perceived susceptibility is an individual's belief on his/her chances of experiencing the threat (Witte, 1992). For example, "Smoking causes cancer," may be perceived as a message with high susceptibility by a smoker, whereas it can be perceived as a message with low susceptibility by a non-smoker. A study that examined the EPPM variables in actual workplace safety messages found that threat

factors such as severity and susceptibility were used in such messages (Basil, Basil, Deshpande, & Lavack, 2013). The study conducted an online experiment, which found a significant main effect of perceived severity on both attitude and behavioral intentions regarding workplace safety. There was also a significant main effect of perceived susceptibility on behavioral intention regarding workplace safety (Basil et al., 2013).

In HBM studies, perceived severity has been defined as beliefs regarding the seriousness of contracting a disease or of leaving it untreated (Janz & Becker, 1984). The dimension of perceived severity includes both the possible medical (i.e., pain, disability, and death etc.) and social (i.e., effects on work and family life) consequences (Janz & Becker, 1984; Rosenstock, 1974). The construct of perceived susceptibility has been defined as the beliefs of an individual regarding the personal vulnerability to a disease (Janz & Becker, 1984). The perceived susceptibility of an individual may vary from extremely denying that there is a possibility of contracting a disease, to a moderate position of accepting that there is some possibility of contracting a disease, and to feeling that one is in real danger of contracting a disease (Rosenstock, 1974).

A study that examined the breast self examination (BSE) behavior and its predictive factors among female university students in Iran using HBM found that among other variables, perceived severity was a significant predictor of BSE behavior (Didarloo, Nabilou, & Khalkhali, 2017). Students who had high perception of severity regarding breast cancer were more likely to conduct BSE than the students who had low perception of severity regarding breast cancer. Another study investigated the effects of physical education program (PEP) on promoting HBM scores and increasing physical activity among Iranian high school students (Rezapour, Mostafavi, & Khalkhali, 2016).

The results showed that components of HBM such as perceived severity and perceived susceptibility in the intervention group significantly increased physical activity among the students than those in the control group who received no intervention.

Both EPPM and HBM include the concept of threat that include perceived severity and perceived susceptibility. Perceived severity is defined as an individual's belief about the seriousness of the threat and perceived susceptibility is defined as an individual's belief regarding their vulnerability of contracting the disease in both HBM and EPPM. Therefore, both EPPM and HBM describe the concepts of threat similarly.

Efficacy

According to EPPM, efficacy is an external stimulus that exists as an environmental or message cue (Witte, 1992). Efficacy includes response efficacy and self-efficacy. Response-efficacy is the effectiveness of the recommended action in avoiding the threat. Self-efficacy is a person's ability to perform the recommended action response (Witte, 1994). The perceived response efficacy is an individual's belief on the effectiveness of the recommended response (e.g. "I strongly believe that if I call the given number in the message, it will be helpful to me to quit smoking") (Witte, 1994). Whereas the perceived self-efficacy is an individual's belief of their ability to perform recommended response (e.g. "I think I am able to quit smoking") (Witte, 1994).

The studies have mostly found results in the direction predicted by EPPM. The meta analysis of fear appeal theory by Witte & Allen (2000) found that as the fear aroused by the fear appeal message increases, the message becomes more persuasive. The findings also showed that the stronger the response efficacy and self-efficacy in a

message, the stronger the attitudes and behavioral intentions toward the recommended response. A study that used EPPM framework on the exercise behaviors of pregnant women found that women who had high perceived self-efficacy for exercising safety were more likely to exercise during pregnancy than those who had low perceived self-efficacy (Redmond et al., 2015). Another study finding showed that EPPM can be a theoretical basis for factors affecting willingness of municipal employees to report to work during an influenza pandemic (von Gottberg, Kurmm, Porzsolt, & Kilian, 2016). The result indicated that perceived self-efficacy and perceived role competence had strong positive willingness to report to the work if asked and not required. Therefore, although not required if the employees are self-confident that they will not contract the influenza and believe that they are able to perform their work well then they are ready to go to work during a high risk situation such as influenza pandemic (von Gottberg, et al., 2016).

Although the concept of self-efficacy was not mentioned in the original HBM model, the concept was added by to HBM by Rosenstock, Strecher, & Becker (1988). The authors argued that people must feel themselves as confident or self-efficacious to implement the change recommended in a health message. They suggested including self-efficacy as a concept not as a part of barrier but as an explicit concept of its own to encourage more productive research and practice (Rosenstock et al., 1988). A study that examined the breast self examination (BSE) behavior and its predictive factors among female university students in Iran using HBM found that self-efficacy was the most important predictor of the behavior (Didarloo et al., 2017). The students who had a high perceived self-efficacy regarding BSE were most likely to perform BSE than any other

factors. Another study used the constructs to HBM to examine the effects of factors related to smoking among the secondary high school in a city in Iran (Mohammadi et al., 2017). One of the findings of the study was that perceived self-efficacy to nonsmoking significantly reduced smoking behaviors among the students. If students were self-confident that they were capable of being a nonsmoker, then that reduced their chances of smoking.

EPPM includes the concepts of self-efficacy and response efficacy. The concept of self-efficacy was later added to HBM. HBM does not explicitly include the concept of response efficacy but it has been interpreted as the concept of benefits in HBM.

Benefits

In HBM, the perceived benefit of taking an action is defined as the belief of a person on how effective the various alternatives may be in reducing the disease threat for an individual (Rosenstock, 1974). Perceived benefit plays an important role in the course of action an individual will take regarding the disease. A person may perceive that the threat of a disease is severe and they are susceptible to the disease but whether or not they will take an action depends on the availability and effectiveness of the various courses of actions that are suggested (Janz & Becker, 1984; Rosenstock, 1974).

Studies have found that perceived benefit of a recommended action has a positive relation with adhering to the action in the message. For example: a study by Zhao et al. (2012) found that HBM can be used as an effective model to predict the condom use among commercial sex workers in China. The study found that perceived benefits towards condom use were significantly related to more use of condom. Another

study found that perceived benefit was the most effective predictor of willingness to eat organic foods among young adults in Iran (Yazdanpanah, Forouzani, & Hojjati, 2015).

The concept of perceived benefit is similar to the concept of response efficacy in EPPM. In EPPM, the concept of perceived response efficacy has been defined as an individual's belief on the effectiveness of the recommended response (Witte, 1994).

Barriers

In HBM, perceived barrier is defined as the cost of taking the recommended action in regards to a health hazard (Rosenstock, 1974). The action that is supposed to be effective in reducing a disease threat may be perceived as being inconvenient, expensive, unpleasant, painful or upsetting (Rosenstock, 1974). These act as barriers to the action, which can then lead to avoidance of such action (Janz & Becker, 1984; Rosenstock, 1974). An individual weighs-in the costs and benefits of an action before making a health decision. If the perceived benefits outweigh the perceived barriers then there is a likelihood of taking recommended health action whereas if the perceived barriers outweigh the perceived benefits then the individual may ignore the recommended health action (Janz & Becker, 1974). For example: a person who is a smoker may want to quit smoking because of his/her susceptibility of lung cancer and the severity of the threat that can cause death but may perceive having to attach a nicotine patch as a barrier because of the inconvenience related to it. But if the person thinks that the benefit of living longer outweighs the barrier of attaching a nicotine patch then they may be motivated to take the recommended action. However, if the person perceives that the barriers outweigh the benefits then the person may not be motivated to take the recommended action.

Studies that have used HBM have found that perceived barrier leads to avoidance of health action by participants. A study by Blue and Valley (2002) found that those who did not get flu vaccination reported significantly higher perceived barrier about getting the vaccination that those who got the vaccination. Participants who did not get the flu vaccination reported that flu shot is time consuming and getting the shot interferes with daily activities. Another study by Guvenc, Akyuz, & Acikel (2011) found that women who had obtained a Pap test had significantly fewer perceived barrier regarding the test than the women who have never had a Pap test. The women reported perceived barrier such as fatalism, cost, preference for female healthcare professionals, and embarrassment during gynecological examination as some of the perceived barrier.

A study by VanDyke (2017) used HBM as a theoretical framework to predict breast cancer screening among women in rural Appalachia. The result showed that perception of fewer barriers increased the frequency of mammography. The author suggested that it is important to reduce barriers by increasing availability to mammogram, increasing public awareness, and providing free services in rural areas. Another study by Lofquist (2012) found that high level of perceived barriers was significantly and inversely related to being tested for HIV among female sex workers in Kenya. The perceived barriers included myths regarding HIV transmission and belief that the test was not always confidential among others. Author suggested addressing these barriers to increase the HIV testing among the vulnerable population (Lofquist, 2012).

The EPPM does not include the concept of barrier. Both the models share the key concepts such as threat, efficacy, benefit (as response efficacy in EPPM) but the

EPPM does not include the concept of barrier. Adding the concept of barrier in EPPM can help health communication scholars to better understand and predict various health behaviors. The next section explains the rationale for extending the EPPM.

Extension of EPPM

Researchers in health communication have advocated for integrating theories of health communication to help the field of health communication to move forward (Cappella, 2006; Noar & Zimmerman, 2005). Both EPPM and HBM are health behavior theories that have grown largely out of the social psychological literature (Noar, 2004). Both HBM and EPPM utilize the fear of negative consequence of a behavior as an important motivator of behavior change and include concepts such as perceived susceptibility and severity (Noar, 2004). Noar (2004) suggests that with multiple behavioral theories in the health communication literature, it can be beneficial to include more than one theory for a prevention effort, especially if the two theories complement each other. The key constructs of EPPM and HBM match each other (susceptibility, severity, and self-efficacy) but HBM also includes the variable, perceived barriers to predict certain health-related actions of individuals (Jung & Brann, 2014). This study extends the EPPM by adding the variable from HBM, perceived barrier to the original EPPM.

The Extended Parallel Process Model (EPPM) was proposed by Kim Witte (1992) to offer both the cognitive and emotional factors associated with fear appeals message processing. Some of the key concepts in the fear appeal research are threat, efficacy, and fear. According to EPPM, when both perceived threat and perceived efficacy are high, danger control processes are initiated (Witte, 1994). The danger

control processes include a change in attitude, intention or behavior as suggested in the message. The fear is at the center of the model in EPPM. Meta-analyses on fear appeal messages have generally found support for the EPPM model. A meta-analysis by Witte and Allen (2000) supported the EPPM. The findings showed that the stronger the fear appeal, the greater the fear aroused, the greater the severity of the threat perceived, and the greater the susceptibility to the threat perceived.

EPPM includes the concepts of fear, efficacy and threat but misses the concept of perceived barrier included in another fear appeal model, the Health Belief Model. Like EPPM, the constructs of HBM have also been supported by meta-analyses. A meta-analysis of the effectiveness of Health Belief Model variables in predicting behavior by Carpenter (2010) showed that severity, barriers, and benefits were all related in the predicted direction to the likelihood of performing the target behavior. Benefits and barriers were the strongest predictors of behavior. A comprehensive review of HBM found that perceived barrier was the most powerful of the HBM dimensions across the various study designs and behaviors (Janz & Becker, 1984). The meta-analysis (Witte & Allen, 2000) also suggested that in order to increase the perception of self-efficacy, practitioners should identify the barriers that act as hindrances for an individual's perceived self-efficacy to perform the recommended action. Therefore, this study will add the concept of perceived barrier in the EPPM, to increase the predicting capability of EPPM theory (See Appendix B for the extended model). A literature review on barriers in health communication helps understand different types of barriers that have been listed by participants to stay healthy or perform recommended action for health benefits.

Perceived Barriers in Health Communication

Perceived barriers are defined as the perceptions that individuals have about the cost and obstacles to adopting recommended actions. The costs or obstacles may include economic as well as other costs related to the lifestyles (Carpenter, 2010). Studies in health communication have found that different types of barriers exist that discourage people from adopting a healthy behavior.

Different barriers that have been studied in health communication include language and cultural barriers, social barriers, psychological barriers, environmental, physical, and personal barriers. Next section will provide an overview of each of these barriers in the health communication literature.

Language and cultural barriers

One of the most common barriers in health communication is language. Studies have found that not being fluent in English language is a major barrier of communication between the health practitioners and service users (Robinson & Gilmartin, 2002; Uba, 1992). This language barrier remains in both the interpersonal and organizational levels. The factors contributing to the language barriers include stereotyping, miscommunication of meanings, and mismatching beliefs and models of care (Robinson & Gilmartin, 2002). South Asian immigrants in the USA listed some of the cultural barriers for seeking health care. These included attitudes towards suffering, causes of illness, distrust of Western medicine, unfamiliarity with Western medicine, health care providers' cultural ignorance, and poor communication between physicians and patients (Uba, 1992).

The existing language and cultural barriers between the patient and the provider such as education level, health literacy level, language barriers, cultural or ethnic differences, age, and cognitive limitations should be addressed to achieve health care goals. The miscommunication or lack of communication was found as a major perceptual gaps between lower income mothers and mental health professionals (Anderson, Robins, Greeno, Cahalane, Copeland, & Andrews 2006). The mothers viewed their difficult life circumstances as the cause of their mental distress whereas mental health system use diagnostic model that includes the symptoms of distress. There was also a lack of trust of mothers towards the clinicians. The mothers viewed clinicians as being a part of the system and having the power of taking their children away from them if they were recognized as having mental distress (Anderson et al., 2006). To address this barrier between the patient and the provider, communication should be recognized as an important link between the two and a critical aspect of providing health care. Communication is the tool through which the providers can help patients follow the recommended treatment and healthy behaviors.

Social Barriers

Social barriers such as stigmatization and lack of support from the family members have been cited as the social barriers in health communication. Studies have found that the perceived barrier to seeking mental health care in the military include the fear of being stigmatized by the peers and the leadership (Hoge et al., 2004). Another important finding was that those who were in the greatest need of the mental health care had the greatest concern about the stigma. Social barriers such as lack of parental support has been found to be one of the major perceived barriers among the children,

youth, and university students. Children, youth, and university students reported social factors such as peer pressure, parental control, lack of parental support, lack of playmates, teasing and bullying from peers, and criticism from peers and teachers that demotivated them from exercising (Gómez-López, Gallegos, & Extremera, 2010; O'Dea, 2003). Similarly, a study that included the overweight boys and overweight girls found that lack of support from parents in addition to the body consciousness were major perceived barriers for being involved in physical activity among the youth (Zabinski, Saelens, Stein, Hayden-Wade, & Wilfley, 2003). These studies show that children, youth, and young adult look for the social support from their parents, teachers and peers to be involved in physical activity or start a healthy lifestyle. When they do not get the social support, they seek for they have less motivation to stay healthy and be physically active.

Psychological Barriers

Perceived psychological barriers such as fear, anxiety, misperceptions about disease have been found to prevent the individuals from seeking health care or being involved in the healthy behaviors (Carter et al., 2017; Champion 1999; Frisby, 2002). Some of the perceived psychological barriers for being involved in physical activity among the racially diverse group included fear of failing, inconvenience, and lack of knowledge (Mathews et al., 2010). Fear of injury was reported as the perceived barrier to exercise by individuals with epilepsy (Collard & Hill, 2017). Perceived psychological barriers to exercising listed by those with arthritis included lack of time, motivation, and enjoyment of the exercise. Stress is another perceived psychological barrier to participation in physical exercise (Pratt, Ha, Levine, & Pratt, 2003).

The individuals who suffer from Coronary Heart Disease (CHD) reported that perceived barriers for engaging in exercise included psychological difficulty in adapting to life after getting the disease, laziness, and time management issues (Godin, Valois, & Jobin, 1991). Overcoming these barriers required social support for the individuals suffering with epilepsy and modification in the exercise routine for the individuals with CHD (Collard & Hill, 2017; Godin, Valois, Jobin, & Ross, 1991). Lack of time was also listed as the perceived barrier to physical exercise by younger age group whereas the older age group were more likely to include the lack of motivation as the barrier to physical exercise (Booth, Bauman, Owen, & Gore, 1997). High school students cited schoolwork as the cause of lack of time whereas the adults listed work as the cause of lack of time for physical activities (Allison, Dwyer, & Makin, 1999). A study of European Union population found that lack of time, lack of willpower, and not wanting to change as some of the perceived barriers to healthy eating (Kearney & McElhone, 1999). The participants had the optimistic bias that they were already eating healthy food. Younger, more educated participants reported the work/study commitments as the perceived barriers for physical activities. The study also found that most of the respondents equated physical activity to sports and mentioned that they were not sporty type or too old for physical activities (Kearney & McElhone, 1999). There was a tendency toward thinking of physical activities as the duty and a strenuous task rather than relating it to fun, recreation, and relaxation (Kearney & McElhone, 1999). Lack of energy has also been listed as the perceived barrier for being involved in physical activity (Arzu, Tuzun, & Eker, 2006; O'Dea, 2003). Psychological barriers for physical activity among the older adults include negative body image and the expectations that

mature adults should be less active (O'Neill & Reid, 1991). Furthermore, older adults have misconceptions that they get enough physical exercise during their daily exercises, which discourage them from being actively involved in physical activities (O'Neill & Reid, 1991). Adolescent girls mentioned lack of time and body-centered issues as the perceived psychological barriers for physical exercise (Dwyer et al., 2006; Tergerson & King, 2002). Adolescent boys, on the other hand, mentioned wanting to do other things with their time as the most common barrier to physical activities (Tergerson & King, 2002).

Patients suffering from different health conditions such as Chronic Obstructive Pulmonary Disease (COPD), stroke survivors, Type 2 disease, and hypertension reported both the intrinsic and extrinsic barriers to exercise (Adeniyi, Idowu, Ogwumike, & Adeniyi 2012; Idowu, Adeniyi, Ogwumike, Fawole, & Akinrolie, 2015; McDonnell, Esterman, Williams, Walker, & Mackintosh, 2014; Valenson, Valmonte, Rodriguez, Medina, Lowrey, Lew, & Nguyen, 2016). The intrinsic barriers to exercise that the patients reported included strong dislike for exercise, lack of interest and motivation, being embarrassed to exercise, pain, and other physical health issues. Another important finding of these studies was that patients who had recently survived stroke rarely related the cause of stroke to the lack of exercise (McDonnell et al., 2014). The study found that the challenge was to get the most vulnerable population to start exercising as something that can be enjoyable while being good for health (McDonnell et al., 2014).

Environmental, Physical, and Personal Barriers

Perceived environmental barriers to healthy lifestyle include different factors such as environmental conditions, cost, and transportation (Wilcox, Der Ananian, Abbott, Vrazel, Ramsey, Sharpe, & Brady, 2006). Some of the major barriers of stroke prevention among African Americans included poor financial status, family pressure, and poor nutrition (Pratt et al., 2003). A study done on adults in Brazil found that lack of money was the most frequently stated barrier to physical activity (Reichert, Barros, Domingues, & Hallal, 2007). The study also found that the higher the number of perceived barriers reported by the individuals, the higher the incidence of physical inactivity. Adolescent girls reported some of the environmental barrier to participate in physical activities such as influence of peers, parents and teachers; concern about safety; inaccessibility of facilities and cost of using them (Dwyer et al., 2006). Perceived environmental barriers such as financial problems, transportation problems, and cost/health insurance were reported by the patients who were struggling with active self-management of chronic disease (Jerant, von Friederichs-Fitzwater, & Moore, 2004). Barriers such as physical health problems, physical symptoms, pain, fatigue, lack of mobility were categorized as perceived physical barriers for those who were in need of a health intervention (Jerant et al., 2004; Wilcox et al., 2006).

For the older population living in assisted facilities, the perceived barriers to physical exercises included both personal and environmental barriers. The perceived barriers included physical health problems, physical frailty, insufficient understanding about physical activity, environmental restriction, pain, helplessness and hopelessness, fear of going outside in the evening, and weather (Chen, 2010). Other personal and

environmental barriers reported by older adults included lack of interest, lack of access, weather, and concerns about safety (Chen, 2010; Gellert et al., 2015). Scholars suggest that in order to overcome those barriers, health care professionals should make an assessment of the problems the older residents are facing and address the barriers to encourage regular exercise among the age group (Chen et al., 2011). Another study on the patients with diabetes found that the patients reported both the physical and motivational barriers to exercise (Shultz, Sprague, Branen, & Lambeth, 2001). The important finding of the study was that there was a discrepancy between the barriers perceived by educators and barriers perceived by patients. The authors suggest that it is important to address this discrepancy through an open dialogue between the educators and the patients so that the educators are able to help the patients (Schultz et al., 2001).

These different types of barriers reported by participants in health communication indicate that individuals are unable to practice healthy behaviors although they know the benefits of those habits. The perceived barriers to practice those health behaviors should be addressed so that the individuals are encouraged to change their attitude, intention or behavior as recommended for a healthy living.

Perceived Barriers in HBM

In HBM, perceived barriers have been defined as the hindrances or costs that must be overcome to follow a health recommendation (Rosenstock, Strecher & Becker, 1994). Studies have used HBM to understand the role of barriers to follow a recommended action mentioned in a health message (Austin, Ahmad, McNally & Stewart, 2002; Zhao et al., 2012). The study by Zhao et al. (2012) found that HBM can be used as an effective model to predict the condom use among commercial sex workers

in China. The study found that perceived severity, perceived benefits, self-efficacy, and lower perceived barriers towards condom use were significantly related to more use of condom. Studies that focused on the cancer screening behavior found that fear of cancer, embarrassment, fatalistic view of cancer, and language were the major perceived barriers to cancer screening (Austin et al., 2002; Bakemeier, Krebs, Murphy, Shen & Ryals, 1995; Coyne, Hohman & Levinson, 1992). For example: a review by Austin et al. (2002) examining the factors influencing breast and cervical cancer screening behavior in Hispanic women found that cancer was associated with a great deal of fear where most believed that cancer cannot be cured.

The HBM has been used as a theoretical framework for studies that aimed to find out the factors influencing the physical activities among individuals. A study found that among the African-American college women, perceived barriers were significantly higher in the inactive stage than in more active stages of physical activity behavior (Juniper, 2004). Several studies have found that there is a negative relationship between the perceived barriers to exercise and exercise participation (Al-Ali & Haddad, 2004; Mo, 2016; Moore, Jilcott, Shores, Evenson, Brownson, & Novick, 2010).

In order to fill the gap in the literature that used the HBM constructs to predict exercise adherence, the study conducted by Mirotznik et al. (1995) developed a questionnaire to measure the dimensions of HBM as they relate to coronary heart disease and exercise. The study result found support for the prediction that attitudes were related to exercise adherence. Perceived severity of CHD was positively related to the behavior, which is the number of exercise sessions attended. However, the participants did not perceive themselves as susceptible to CHD. The factors such as

health problems and interference with normal activities were not perceived as barriers to the exercise. The perceived benefit was, however, negatively related to attendance in exercise sessions, but the result was not significant. Although the result did not show that the HBM variables were associated with exercise sessions attendance in the predicted direction, the study provided a platform for the future studies examining the relationship between the HBM variables and exercise adherence for a healthy behavior.

Some of the perceived barriers to physical exercise reported by the participants included lack of motivation to exercise, lack of energy, bad weather, school assignments, and lack of time (Booth et al., 1997; Kasser & Kosma, 2012; Pratt et al., 2003). Lack of time or time management issues cited by patients with arthritis, patients of CHD, younger age group, high school students (schoolwork), adults (work), adolescent girls, patients of chronic obstructive pulmonary disease (COPD), stroke survivors, patients of Type 2 disease, and hypertension (Allison et al., 1999; Booth et al., 1997; Dwyer et al., 2006; Pratt et al., 2003; Tergerson & King, 2002). In sum, people of various ages and patients of heart related as well as other health conditions have cited lack of time as a perceived barrier to exercising. This study, therefore, addresses the issue of time as the perceived barrier for physical activities.

Several studies have recommended that in order to increase physical activities among inactive population, health interventions should be focused on addressing the perceived barriers (Allison et al., 1999; Booth et al., 1997; Kearney & McElhone, 1999). When such perceived barriers are recognized and addressed in intervention programs, it helps to increase the self-efficacy of individuals to promote physical activities for healthy living (Hosseini, 2017; Kasser & Kosma, 2012; Mo, 2016). An

increase in self-efficacy can increase the individuals' believes that they are capable of doing the exercises, which in turn affects the actions of the individuals (Hosseini, 2017). In line with theses suggestions, a meta-analysis on the HBM suggested that the perceived barrier was the better predictor of a behavioral outcome when the behavior was preventive than when the behavior was a treatment (Carpenter, 2010). The meta-analysis suggested that the future studies should report the interaction between the HBM variable and self-efficacy.

EPPM and Exercise

There have been few studies that have integrated multiple theories to increase those theories' predictive power. One such study integrated the Theory of Planned Behavior (TPB) and Extended Parallel Process Model (EPPM) with an aim to increase the explanatory power of TPB to predict intentions to exercise (Richards & Johnson, 2014). The study added the variables of EPPM that include perceived susceptibility, perceived severity, self-efficacy, and response efficacy to TPB. The integrated model indicated that individuals' intentions to exercise were the consequence of the belief that engaging in exercise results in desirable effects. Thisis the belief that others will support their exercising, that they are capable to exercise successfully, and that the belief that they are under risk of weight-related illnesses (Richards & Johnson, 2014). However, the authors suggested that the integration of the two models of TPB and EPPM was still inadequate to predict exercise intentions and other psychological constructs may need to be considered for better predictions of exercise intentions (Richards & Johnson, 2014).

Another study that used EPPM constructs to encourage the physical activity intention and behaviors among men found that men who received risk message

combined with high efficacy were more likely to meet the physical activity guidelines at follow-up than the men who received same message but with no risk (Hatchell, Bassett-Gunter, Clarke, Kimura, & Latimer-Cheung, 2013). Therefore, it was suggested that while using the risk message to encourage physical activities, the health practitioners should pair such message with high efficacy message so that the risk messages are not ignored by the individuals. Another study using the EPPM framework to predict physical activity among pregnant women found that women who had a sedentary lifestyle were more fearful of harming the baby when they were physically active than the women who had an active lifestyle. The study also found that those women who exercised more than 90 minutes per week cited time commitment as the positive predictor of exercising (Redmond, Dong, & Frazier, 2015). The result is in contrast to most of the studies that have listed busy schedules as a barrier to exercising.

Researchers have suggested that perceived barrier should be added as a variable to EPPM to increase its explanatory and predictive power (Carcioppolo, 2008). Carcioppolo (2008) evaluated the constructs of response costs and perceived barrier in EPPM for the influenza and sexually transmitted disease (STDs). The measures for perceived barriers were developed by asking participants to list the perceived barriers for getting influenza vaccination and getting tested for STDs. The study failed to find the relationship between the perceived barriers and intention to get vaccination or get tested for STDs. However, the limitation of the study should be noted regarding the result. The message used in the study omitted the content regarding self-efficacy and perceived barriers completely from the message. This may have affected the finding of the study. There is a need for further studies that includes the components of EPPM and

barrier in message to understand how the EPPM variables and barrier can be integrated to increase the prediction power of the EPPM model.

Healthy Diet and CVD

The AHA recommends eating healthy diet to lower the risk of CVD. One way of eating healthy everyday is adding fruits and vegetables to every meal and snack. All forms of fruits and vegetables such as fresh, frozen, canned, and dried and all colors count when it comes to healthy eating. The AHA recommends four to five servings of each (fruits and vegetables) each day. Fruits and vegetables are recommended to be added in the diet because they are rich in nutrients, low in calories, and high in fiber (Lichtenstein et al., 2006). Following a healthier diet has been linked with the reduction of risk factors associated with CVD such as high blood pressure (Appel et al., 1997). Lichtenstein et al. (2006) suggest that a variety of fruits and vegetables should be eaten for a healthy heart such as spinach, carrots, peaches, and berries. A diet that includes plenty of fruits and vegetables can be used to lower the energy density of the diet to control energy intake (Lichtenstein et al., 2006)

Studies have used the fear appeal theories such as HBM to understand and predict the relationship between the variables such as threat, susceptibility, severity, barriers, and benefits and healthy eating behavior. A study used HBM to predict the likelihood of eating healthy among university students (Deshpande, Basil, & Basil, 2009). The study found that dietary status, perceived susceptibility, and cues to action were the significant predictors of the importance of eating a healthy diet. However, perceived severity did not influence the importance of eating a healthy diet. The barriers influenced the behavior of eating healthy directly as well as indirectly via efficacy.

Barriers significantly and negatively affected behavior intention among females but not among males. The barriers included the taste, time and difficulty of following a healthy diet. Another study by McKinley (2009) tested the relationship between perceived threats, social support, and the attitude and behaviors of college students for healthy eating. The threat used in the study was obesity. The study found that perceived threat did not predict eating behavior in overall college student sample. However, for the female respondents perceived positively predicted drive for thinness. The author cautioned that drive for thinness is related to eating disorder symptoms and future study should look at those relationships more carefully. The study was based on the correlational findings, therefore, the author also suggests for future studies to manipulate threat appeal in an experimental study design for causality (McKinely, 2009).

A study that was conducted among the African American population living in North Carolina found that participants gave higher scores to the perceived benefits of eating healthy than perceived barriers of eating healthy (Pawlak & Colby, 2009). The cost of buying healthy food was cited as the only significant barrier of eating healthy. The participants also reported high self-efficacy of healthy food consumption and buying food to help them improve their diet. Although the participants saw more benefits and fewer obstacles for eating healthy, the study showed that these believes did not lead to perceived increased intakes of healthy food.

Another study that looked at perceived barriers for healthy eating among participants from European Union countries found that the most common cited barrier for healthy eating was lack of time (Lappalainen, Saba, Holm Mykkanen & Gibney,

1997). The younger and more highly educated participants reported lack of time as the barrier to eating healthy because of the time it takes to prepare such meals. Taste was another frequently cited barrier for healthy eating. A qualitative study that investigated the relationship between barriers reported by people before and after a food intervention program found that participants reported different types of barriers to eating fruits and vegetables (John & Ziebland, 2004). The participants reported the barrier of high cost, lack of time, and lack of access to fruits and vegetables as the most difficult barriers to overcome. Other barriers included the lack of support from family members and especially children who do not want to eat fruits and vegetables. The authors suggest that the intervention programs should be geared towards the participants to fit their needs and schedules. In accordance with the studies that have cited time to prepare healthy meals as one of the most cited perceived barriers of healthy eating, this study will address the time as the barrier for eating healthy.

For the purpose of this study, narratives were used as message stimuli for persuasion. The rationale for using the narrative is discussed in the next section.

Narratives

A narrative consists of one or more scenes, characters and conflicts while raising the unanswered questions and unresolved conflict and providing the resolution (Hinyard & Kreuter, 2007). Narrative is a basic form of human interaction such as telling the personal stories about one's experiences to others (Hinyard & Kreuter, 2007). The concept of transportation is used in narrative where an individual gets immersed into the vivid imagery of the narrative (Green & Brock, 2002). Green (2006) defines transportation as "an integrative melding of attention, imagery, and feelings, focused on

story events" (p. 247). Narratives have been used in the persuasion because when individuals are immersed into the story and identify with the characters, then it increases the possibility of the change of belief or attitude endorsed by the narrative (Green & Brock, 2002; Kim, Bigman, Leader, Lerman, & Cappella, 2012; Slater & Rouner, 2002).

Researches in health communication have found that using narratives and exemplars in a health message are positively related to change in the attitude, intention, and behavior of individuals regarding the proposed health behaviors (Kim et al., 2012; Prati, Pietrantoni & Zani, 2012; Sukalla, Wagner & Rackow, 2017). Petraglia (2007) suggested that the effectiveness of narrative interventions is more the result of how stories are perceived by the audience rather than what the message designers intended to communicate. Therefore, if the producers of the narratives want them to be successful in the desired health interventions, then they should make an effort to understand how the narratives are interpreted by the audience (Petraglia, 2007). Similarly, Slater and Rauner (2002) argued that the engagement of the audience or narrative depends upon the extent to which the narrative addresses their needs and goals.

Scholars have been trying to understand what components in narratives can help influence the behavior. Studies have found that narratives are successful in influencing behavior because identification of an individual with a character increases self-efficacy in the audience (Kazdin, 1979; Moyer-Guse, Ghung & Jain, 2011). Identification has been defined as "an emotional and cognitive process whereby a viewer imagines himself or herself as a particular character" (Moyer-Gusé & Nabi, 2010, p. 29). A study by Moyer-Guse et al. (2011) found that when participants were exposed to narratives

with characters engaging in sexual discussions with friends, medical professionals, and sexual partners, the viewers were motivated to do the same. The viewers reported that they engaged in similar discussions with their partners, friends, or medical professionals over a two-week period after their exposure to the narrative message. The use of narratives has been effective in health communication to decrease the resistance against a persuasive message by decreasing the likelihood of counter arguing, ignoring the message or denying the effectiveness of the message (Kureter et al., 2010; Slater & Rauner, 2002). Scholars have posited that identification with a character leads the audience to embrace the views and thoughts of the character and decreases the instances of the counterarguments (Moyer-Gusé & Nabi, 2010; Slater & Rouner, 2002).

In the study by Moyer-Guse and Nabi (2010), the participants viewed either a narrative or non-narrative program depicting the difficulties associated with teenage pregnancy. The narrative was an entertainment-educational (E-E) program. This study showed that identification with the characters of a narrative decreased the counterargument (Moyer-Gusé & Nabi, 2010). Studies conducted to explore the influence of health behaviors that compared the narrative and non-narrative messages have found that narratives are better in changing the knowledge, attitudes, and behavioral intentions in individuals than non-narrative messages (Krueter et al., 2010; Murphy, Frank, Chatterjee & Baezconde-Garbanati, 2011). A study by Prati et al. (2012) found that narrative communication based on EPPM had more persuasive effects for getting influenza vaccination among people aged 65 years or older compared to didactic communication.

The literature indicates that narratives can better persuade people to follow the health recommendations in the message than didactic message. Therefore, the present study used narrative message to influence the participants regarding a health behavior. This study included a second narrative message that will be manipulated across the eight conditions as a message replication. The second narrative message focused on persuading individuals to eat healthy diet to lower the risk of CVD.

The use of narrative in health communication literature shows a lot of promise. It is useful to know whether or not transportation into the narrative world and identification with the characters is influenced by the level of threat, efficacy, and barriers manipulated in a message.

Chapter 3: Hypotheses

The purpose of the current study is to integrate the concept of HBM, perceived barriers, into the EPPM model with an aim of increasing the predictive power of the model. This study focuses on the physical exercise and healthy eating behaviors and their relation to heart health. The goal is to persuade the readers to be involved in the healthy habit of exercising to stay healthy and avoid cardiovascular disease (CVD). Based on the literature reviewed in the previous chapter, this chapter proposes the hypotheses of this study. First, the main effects of independent variables are discussed.

Main effects

The main effects of the independent variables (threat, efficacy and barriers) are discussed here.

Threat

A fear appeal message has been conceptualized as a message that "directly associates the targeted behavior (e.g., tobacco use) with a threat (e.g., disease, death)" (Leshner et al., 2011, p. 79). A threat of a message is characterized by the severity of threat (e.g., "Smoking causes cancer") and the individual's susceptibility to the threat (e.g., "You're at risk for cancer because you smoke everyday") (Witte, 1992). Perceived severity refers to an individual's belief about the seriousness of the threat. The construct of perceived susceptibility has been defined as the beliefs of an individual regarding their personal vulnerability to a disease (Janz & Becker, 1984). According to EPPM, the higher the threat of a message, the higher the perceived severity and perceived susceptibility (Witte, 1992; Witte 1994). When a person perceives a threat message as significantly and personally relevant then it leads to the arousal of fear (Easterling &

Laventhal, 1989; Lang, 1984; Ortony & Turner, 1990). Therefore, the following hypotheses are proposed:

H1a: The participants who read a high threat message will report higher perceived severity and susceptibility regarding heart diseasethan the participants who read low threat message.

H1b: The participants who read a high threat message will report higher perceived fear regarding than the participants who read a low threat message.

Efficacy

According to EPPM, when the appraisal of threat leads to moderate or high perceived threat in the individual then it stimulates fear that motivates the individual to start the second appraisal (Witte, 1992). The second appraisal is the assessment of the efficacy of the recommend response. Efficacy refers to the "effectiveness, feasibility, and ease with which a recommended response impedes or averts a threat." (Witte, 1994, p. 114). Efficacy includes response efficacy and self-efficacy. Response efficacy is the effectiveness of the recommended action in avoiding the threat. Self-efficacy is a person's ability to perform the recommended action response (Witte, 1994). The belief of an individual about the efficacy of a message is the perceived efficacy. The message with high efficacy should then lead to high perceived response and self-efficacy (Witte, 1992; Witte 1994). This study proposes the following main effect for the efficacy:

H2a: The participants who read a high efficacy message will report a higher perceived self-efficacy about exercising (and eating healthily) that the participants who read a low efficacy message.

H2b: The participants who read a high efficacy message will report a high response-efficacy about exercising (eating healthily) than the participants who read a low efficacy message.

Barriers

In HBM, barriers are defined as the cost of taking the recommended action in regards to a health hazard (Rosenstock, 1974). The action that is supposed to be effective in reducing a disease threat may be perceived as being inconvenient, expensive, unpleasant, painful or upsetting are perceived as barriers (Rosenstock, 1974). These act as barriers to the action, which can then lead to avoidance of such action (Janz & Becker, 1984; Rosenstock, 1974). Research has shown that people of various ages and patients of heart-related as well as other health conditions have cited lack of time as a perceived barrier to exercising (Allison et al., 1999; Booth et al., 1997; Dwyer et al., 2006; Pratt et al., 2010; Tergerson & King, 2002). This study, will therefore address the issue of time as the perceived barrier for physical activities and healthy eating. Several studies have recommended that in order to increase the physical activity among an inactive population, the health interventions should be focused on addressing the perceived barriers (Allison et al., 1999; Booth et al., 1997; Kearney & McElhone, 1999). In line with the literature review on the perceptions of health barriers, the following hypotheses are proposed for this study:

H3:The participants who read a message that addresses the barrier of the amount of time required to exercise (or prepare healthy meals) will report lower perceived barrier than the participants who read a message that does not address the barrier.

H4 The Participants who read a message that addresses the barrier to exercise (or prepare healthy meals) will report higher perceived self-efficacy than the participants who are read a message that does not address the barrier.

Next, the hypotheses are based on the interaction between the independent variables.

Interactions

Threat and Efficacy

According to EPPM, when the individual perceives that the threat is high and the actions recommended in the messages are effective and they are capable of performing the action then the danger control process is initiated. This leads to the individual responding to the danger and not the fear. But on the other hand, when the threat is high but individual is not convinced that the message recommendations are effective or they are not capable of successfully deterring the threat, then it intensifies the fear. This then leads to defensive motivation through ignoring the message or denying that the threat exists (Witte, 1992). Fear control responses include defensive avoidance, issue derogation, and perceived manipulation (Witte, 1998). A meta analysis of fear appeal theory by Witte & Allen (2000) found that as the fear aroused by the fear appeal message increases, the message becomes more persuasive. The findings by Witte and Allen (2000) showed that stronger the response efficacy and self-efficacy in a message, the stronger the attitudes, intentions, and behaviors toward the recommended response. Following interactions between threat and efficacy are hypothesized for the current study:

H5a: The participants who read a high threat and low efficacy message will report higher fear about heart disease than the participants who read a high threat and low efficacy message.

H5b: The participants who read a high threat and low efficacy message will report more defensive avoidance regarding the message than the participants who read a high threat and high efficacy message.

H5c: The participants who read a high threat and low efficacy message will report more issue derogation regarding the message than the participants who read a high threat and high efficacy message.

H5d: The participants who read a high threat and low efficacy message will report higher perceived manipulation regarding the message than the participants who read a high threat and high efficacy message.

H6a: The participants who read a high threat and high efficacy message will report more positive attitudes about exercising (and eating healthily) than the participants who read a high threat and low efficacy message.

H6b: The participants who read a high threat and high efficacy message will report greater intentions to exercise (and eat healthily) than the participants who read a high threat and low efficacy message.

Threat, Efficacy and Barrier

A meta-analysis of HBM found that perceived barrier was the most powerful of the HBM dimensions across the various study designs and behaviors (Carpenter, 1984). The meta-analysis (Witte & Allen, 2000) also suggested that in order to increase the perception of self-efficacy, practitioners should identify the barriers that act as

hindrances for an individual's perceived self-efficacy to perform the recommended action). Researchers have concluded that when perceived barriers are recognized and addressed in the intervention programs, it helps to increase the self-efficacy of individuals to promote physical activities for healthy living (Hosseini, 2017; Kasser & Kosma, 2012; Mo, 2016). An increase in self-efficacy increases the individuals' believes that they are capable of doing the exercise, which in turn affects the actions of the individuals (Hosseini, 2017). But first, the threat should be perceived as high in order to start the second appraisal of efficacy leading to behavioral change (Witte, 1992; Witte 1993). The following two-way and three-way interactions of threat, efficacy, and barrier are hypothesized for this study:

H7: The participants who read a high threat message that addresses the barrier to exercise (and eat healthily) will report higher perceived self-efficacy than the participants who read a high threat message that does not address the barrier.

H8a: The participants who read a high threat message that addresses the barrier to exercise (and eat healthily) will have more positive attitudes about exercising than the participants who read the high threat message that does not address the barrier.

H8b: The participants who read a high threat message that addresses a barrier to exercise (and eat healthily) will report greater intentions to exercise than the participants who read a high threat message that does not address the barrier.

H9a: The participants who read a high threat and a high efficacy message that addresses the barrier to exercise (and eat healthily) will have the most positive attitudes towards exercising (and eating healthily) than the participants in other message conditions.

H9b: The participants who read a high threat and a high efficacy message that addresses the barrier to exercising (and eating healthily) will have the highest intention to exercise (and eat healthily) than the participants in other message conditions.

Narrative Effects

Transportation and Identification

Narratives have been used in persuasion because when individuals are immersed into a story and identify with characters, it increases the possibility of the change of belief or attitude endorsed by the narrative (Green & Brock, 2002; Kim et al., 2012; Slater & Rouner, 2002). Transportation has been defined as "a convergent process, where all mental systems and capacities become focused on events occurring in the narrative," (Green & Brock, 2000, p. 701). Researches in health communication have found that using narratives and exemplars in a health messages are positively related to change in the attitude, intention and behavior of individuals regarding the proposed health behaviors (Kim, 2012; Prati et al., 2012; Sukalla, Wagner & Rackow, 2017). Studies have found that narratives are successful in influencing behavior because the identification of the individual with the character increases the self-efficacy of the audience (Kazdin, 1979; Mayor-Guse, Ghung & Jain, 2011). However, no research has looked into how the manipulation of threat, efficacy and barrier in a message will affect the level of transportation and identification the audience will feel regarding a narrative. Therefore, following research questions are asked:

RQ1: Will the participants' report of transportation to the narrative world vary among the manipulations of threat, efficacy, and barriers in the message?

RQ2: Will the participants' identification with the character of the narrative vary among the manipulations of threat, efficacy, and barriers in the message?

Chapter 4: Method

As discussed earlier, the purpose of this study is to extend EPPM by adding the variable barrier from HBM. This study focuses on the physical exercise and healthy diet and behavior and their relation to heart health. The goal is to persuade the readers to be involved in the healthy habit of exercising to stay healthy and CVD.

This study utilized online experiment as the methodology to test the proposed hypotheses. An experimental method was chosen for the current study because an experiment is the best method for determining a cause and effect relationship between variables (Leshner, 2013). Experiments include manipulation of the independent variables, random assignment to the experimental conditions, and strong control of the cause of variation in dependent variables that are not related to manipulation (Leshner, 2013). These three elements of an experiment are essential for establishing causal relationships between independent and dependent variables. The independent variable must precede the dependent variable in time so that a change in the value of dependent variable is attributed to the change in the value of independent variable (Leshner, 2013).

This study used a 2 threat (high vs. low) × 2 efficacy (high vs. low) × 2 barriers (addressed/vs. not addressed) x 2 (message replication) mixed factorial design. The threat x efficacy x barriers was a between-subject design whereas the message replication was a within subject design. The study used narratives as the stimuli messages. Narratives were used as the message component because research studies conducted to influence health behaviors that compared narrative and non-narrative messages have found that narratives are better in changing knowledge, attitudes, and

behavioral intentions than non-narrative messages (Krueter et al., 2010; Murphy, Frank, Chatterjee & Baezconde-Garbanati, 2007).

Sample Size

The required (a priori) sample size for this study was calculated using the G* power software (Faul, Erdfelder, Lang, & Buchner, 2007). The study anticipated a medium effect size (i.e., f=0.25), the alpha probability level is 0.05, with a power of 0.8. The study had eight between-subject treatment groups. The f-static showed that the required sample size would be 240, which is 30 participants per condition. However, considering the possibility of missing data and outliers, the study collected more than the required minimum required sample size. The study initially collected the sample size of 532. After cleaning for the missing data and outliers, the final sample size was 446. The details of data cleaning are discussed in the results section.

Participants

The participants were recruited from the Amazon Mechanical Turk (MTurk) online panels at the 95% HIT (Human Intelligence Task) approval rate. The percentage signifies online investigations submitted by the workers that have been approved by the requesters to ensure the response quality. The participants were workers who met the age requirement (18 or above). Scholars have noted that MTurk can be used as a good alternative to collecting data from other sources such as students, professionals and online professional panels (Kees, Berry, Burton, & Sheehan, 2017). A test of data quality across five distinct samples: two student samples; two different samples obtained from professional research companies, which included Qualtrics sample and Lightspeed sample; and MTurk workers was conducted (Kees et al., 2017). The result

showed that response quality of the MTurk sample was good while comparing to the student samples whereas the samples from the professional panels had the lowest overall response quality. MTurk sample were significantly more involved in message processing and also reported less multitasking than the other samples. The MTurk sample also wrote more text while answering the two open-ended questions than both the panel samples. The MTurk sample performed best in attention check measures while compared to student and professional samples. The professional panels performed the worst. The manipulation check results showed that the effect of the manipulation was stronger for MTurk and student samples than the two professional samples (Kees et al., 2017). More researchers in a variety of disciplines are increasingly using MTurk for data collection because data can be collected quickly and at lower cost than other online resources (Sheehan, 2018). In addition, the participants are demographically more diverse than the traditional student samples (Sheehan, 2018).

A total of 446 U.S. residents were recruited for this study. The participants were randomly assigned to one of the eight experimental groups with following number of participants: 1) high threat-high efficacy-barrier addressed; 65 2) high threat-high efficacy-no barrier addressed; 57 3)high threat-low efficacy-barrier addressed; 52 4)high threat-low efficacy-no barrier addressed; 58 5)low threat-high efficacy-barrier addressed; 54 6)low threat-high efficacy-no barrier addressed; 51 7)low threat-low efficacy-barrier addressed; 58, and 8)low threat-low efficacy-no barrier addressed; 51.

A total of 247 participants were female (55.4%), 198 participants were male (44.4%), and one participant was identified as other (.2%). Participants' age ranged from 19-76 years (M=39.80, SD=12.420). A total of 327 participants were "White or

Caucasian" (73.3%), 36 participants were "Black or African American" (36%), 27 participants were Hispanic (6.1%), 40 participants were Asian (9%), 4 participants were "Native American" (0.9%), and 11 participants reported themselves as Other (2.5%).

59 participants reported that they had an annual household income within the range of $20,000-$29,000 (13.2%), 57 participants reported that they had an annual household income within the range of $50,000-$59,999 (12.8%), 54 participants reported that they had an annual household income within the range of $30,000-$39,999 (12.1%), 52 participants reported that they had an annual household income within the range of $70,000-$79,999 (11.7%), 44 participants reported that they had an annual household income within the range of $60,000-$69,999 (9.9%), 44 participants reported that they had an annual household income within the range of $40,000-$49,999 (9.9%), 44 participants reported that they had an annual household income of $90,000-$99,999 (9.9%), 37 participants reported that they had an annual income of $80,000-$89,000 (8.2%), 30 participants reported that they had an annual household income of $10,000-$10,999 (6.7%), 6 participants reported that they had an annual household income of $100,000-$149,999 (3.1%), and 11 participants reported that they had an annual household income of less than $10,000 (2.5%).

A total of 204 participants had completed a bachelor's degree (45.7%), 78 participants had completed some college (17.5%), 58 participants had completed a master's degree (13.0%), 45 participants had completed an associate degree (10.1%), 38 participants had completed a high school degree/GED (8.5%), 6 participants had completed a doctoral degree (1.3%), and 4 participants had completed less than high school (0.9%).

317 participants reported that they were employed full-time (71.1%), 53 participants reported that they were employed part-time (11.9%), 47 people reported that they were not employed (10.5%), and 28 participants reported that they were retired (6.3%).

A total of 216 participants reported that they were married (48.4%), 173 participants reported that they were single (never been married) (38.8%), 44 participants reported that they were divorced (9.9%), 9 participants reported that they were widowed (2.0%), and 4 participants reported that they were separated (0.9%).

419 participants reported that they had not been diagnosed with heart disease (94.8%) and 23 participants reported that they had been diagnosed with heart disease (5.2%). 254 participants reported that they had a close family member who has been diagnosed with heart disease (57%) and 191 participants reported that they did not have a close family member who had been diagnosed with heart disease (42.8%).

Dependent Variables

The dependent variables included perceived fear, perceived susceptibility, perceived severity, perceived response efficacy, perceived self efficacy, perceived barriers, attitude toward exercise and healthy diet, intention to exercise and eat healthy diet, defensive avoidance, issue derogation, perceived manipulation, transportation to the narrative world, and identification with the character. (See Appendix D for the questionnaire).

Perceived Fear

The perceived fear scale was adopted from Dillard and Peck's (2000) study. It consisted of three items: "I am afraid of coronary heart disease," "I am frightened by

coronary heart disease," and "I am scared of the coronary heart disease." The perceived fear was measured using a 7-point Likert type scale where "1" = "strongly disagree" and "7"= "strongly agree" (Cronbach $\alpha = 0.93$).

Perceived Severity and Perceived Susceptibility

The perceived severity and perceived susceptibility scales were derived from HBM measures relating to coronary heart disease and exercise by Mirotznik et al. (1995). The perceived severity included three items regarding the seriousness of heart condition such as, "If I develop a heart disease it would be a serious condition (I already have heart disease and if my condition was to get worse, it would be a serious condition.)," "Heart disease is a severe medical condition," and "A heart condition does NOT necessarily have to interfere with a person's capacity to live a normal life. (reversed)" (Cronbach $\alpha = 0.71$). The perceived susceptibility was measured with three items related to beliefs about likelihood of being vulnerable to heart disease such as, "It is likely that someday in the future I will be ill with heart disease," "My present lifestyle puts me at risk of developing heart disease. (I already have heart disease, am my lifestyle puts me at risk of aggravating my present condition)," and "In comparison to other people, I am more susceptible to developing a serious heart condition" (Cronbach $\alpha = 0.51$). The perceived severity and perceived susceptibility utilized a 7-point Likert type scale where "1"= "strongly disagree" and "7"= "strongly agree"

Perceived Self-efficacy and Response Efficacy

The perceived self-efficacy and response-efficacy scales were derived from Richards and Johnson (2014). The perceived self-efficacy was measured using six items "Exercising for 30 minutes per day 5 days a week during the next month will be easy

for me," "Exercising for 30 minutes per day 5 days per week during the next month will difficult for me (reversed)," "Exercising for 30 minutes per day 5 days per week during the next month will be inconvenient for me (reversed)," "I am able to exercise for 30 minutes per day 5 days per week during the next month," "I am certain I could exercise for 30 minutes per day 5 days per week during the next month," and "If I wanted I could easily exercise for 30 minutes per day 5 days per week during the next month." For the eating healthy diet behavior, the perceived self-efficacy items will be modified to include (eating five servings of fruits and vegetables each day instead of exercising for 30 minutes per day 5 days a week). (Cronbach $\alpha = 0.93$). The perceived self-efficacy utilized a 7-point Likert type scale where "1"="strongly disagree" and "7"="strongly agree."

Perceived response-efficacy was measured with two items (Richards & Johnson, 2014). The items included the measures, "Engaging in regular exercise works in preventing heart disease" and "Engaging in regular exercise is effective in preventing heart disease" For the healthy diet behavior, the items were modified to include "Eating fruits and vegetables works in preventing heart disease" and "Eating fruits and vegetables is effective in preventing heart disease" (Cronbach $\alpha = 0.89$). The perceived self-efficacy and perceived response-efficacy utilized a 7-point Likert type scale where "1"= "strongly disagree" and "7"= "strongly agree".

Intentions to Exercise and Eat Healthy

The intentions were measured using a two-item scale (Richards & Johnson, 2014). The items included the statements, "I intend to exercise for at least 30 min per day, 5 days per week during the next month" and "I will exercise for at least 30 min per

day, 5 days per week during the next month" The items for the healthy diet behavior were modified to include "I intend to eat four to five servings of fruits and vegetables each per day during the next month" and "I will eat four to five servings of fruits and vegetables each per day during the next month" (Cronbach $\alpha = 0.88$).The intentions to exercise and eat healthy diet utilized a 7-point Likert type scale where "1"= "strongly disagree" and "7"= "strongly agree".

Perceived Barriers

Perceived barriers were measured with three items that included time required to perform exercise and eat healthy diet regularly (Mirotznik et al. 1995). The measures included the items, "Exercising regularly is costly in terms of time," "It is hard to find the time to exercise regularly," and "Having to exercise regularly interferes with my normal activities" The items were modified to include healthy diet behavior (e.g. eat fruits and vegetables). The perceived barriers to exercise and eat healthy diet utilized a 7-point Likert type scale where "1"= "strongly disagree" and "7"= "strongly agree".

Attitude towards Exercise and Healthy Diet

The participants' attitudes towards exercise were measured using a four-item semantic differential scale (Richards & Johnson, 2014). The statement asked the participants to indicate the extent to which engaging in exercise during the next month would be good/bad, enjoyable/not enjoyable, unwise/wise, and beneficial/not beneficial where "1"= "good" and "7"="bad." The statement for healthy diet were modified to ask the participants to indicate the extend to which eating healthy diet during the next month would be good/bad, enjoyable/not enjoyable, unwise/wise, and beneficial/not beneficial. (Cronbach $\alpha = 0.84$)

Defensive Avoidance

The defensive avoidance was measured using a two-item semantic differential scale (Witte et al., 1998). The statement asked the participants to indicate "When I first heard about heart disease, my first instinct was to "want to/not want to think about heart disease and want to/not want to do something to keep myself from getting heart disease where "1"= "not want to" and "7"= "want to." (Cronbach $\alpha = 0.69$ (immediate), 0.81 (two-week follow up).

Issue Derogation

The issue derogation was measured using a three-item semantic differential scale (Witte et al., 1998). The statement asked the participants whether they thought the message was "overblown," "exaggerated," or "overstated" where "1"= "not at all overblown" and "7"= "overblown." (Cronbach $\alpha = 0.93$ (immediate), 0.95 (two-week follow up)

Perceived Manipulation

The perceived manipulation was measured using a three-item semantic differential scale (Witte et al., 1998). The statement asked the participants whether they felt the message was "manipulative," "misleading," or "distorted" where "1"= "not at all manipulative" and "7"= " manipulative." (Cronbach $\alpha = 0.97$ (immediate), 0.96 (two-week follow up)

Transportation

The participants' transportation to the narrative world was measured using a eight item scale (Green & Brock, 2000) that included, "When I was reading the story, I could easily picture the events in it taking place," "When I was reading the story,

activity going on in the room around me was on my mind (reversed)," "I was mentally involved in the narrative while reading it," "After finishing the story, I found it easy to put it out of my mind (reversed)," "The narrative affected me emotionally," "I found my mind wandering while reading the story (reversed), "The events in the story are relevant to my everyday life," and "The events in the story have changed my life." The transportation to the narrative world utilized a 7-point scale where "1"= "not at all" and "7"= "very much". Only eight items were used in this study out of 11 original items because the original items were based on a true story where a little girl was brutally murdered in the mall. The current study is about a health threat. Therefore, the items that were not relevant to the current study were not included.

Identification

The participant's identification with the character in the narrative was measured using a four-item scale (Murphy, Frank, Chatterjee, & Baezconde-Garbanati, 2011) that included the items: "How similar are you to Riley (Pat)?", "How much do you like Riley (Pat)?," How much do you feel like you know Riley (Pat)?", and "How much do you want to be like Riley (Pat) ?" (Cronbach α ranged from 0.71-0.78 for different characters). The identification with the character utilized a 7- point scale where "1"= "not at all" and "7"= "a great deal."

Demographic Information and Health Behaviors

The participants were asked to provide their demographic information such as age, sex, religion, marital status, income, ethnicity, education, and if they or their close family members had been diagnosed with heart disease. The participants were also asked questions about their exercise behaviors: "how often do you participate in

following physical activities in a typical week?" on a 7-point scale where "1"= "not at all" and "7"= "very much." The participants were also asked about their eating behavior, "How much fruits and vegetables do you consume in a typical day?" on a 7-point scale where "1"= "not at all" and "7"= "very much."

Stimulus Material

For this study the independent variables that were manipulated were threat, efficacy, and barriers as the message variables. One narrative message stimulus was devised for each condition based on manipulations of threat, efficacy, and barrier. High-threat message for both exercise and eating healthy identified some severe effects of not exercising or eating healthy on heart health. High threat message described heart disease as severe, "If kept being sedentary, there will be severe health risks including high blood pressure, heart attack, and other heart related problems that can even cause death." Low threat messages, in contrast, described some less severe effects of not exercising such as "If I kept being sedentary, there will be some health risks including low energy, high stress, bad mood, and heart disease." For the high efficacy message about exercise, response efficacy was maximized by the narrator's emphasis on the effectiveness of brisk walking to improve heart health. The self-efficacy was increased by citing the ease of taking a walk and suggesting the new starters to begin exercising with moderate physical exercises. The response efficacy was maximized by indicating that walking regularly is effective at improving heart health. For the low efficacy message, response efficacy was minimized by suggesting that walking regularly was not very effective in improving heart health. The self-efficacy was minimized by low confidence of the narrator in their ability to exercise regularly. The barrier was

manipulated by addressing one of the most common cited barriers to the exercise, time. The second message condition for the independent variable barrier, was manipulated by not addressing the barrier at all. Another narrative message on healthy diet was included as the message replication. In the narrative addressing the healthy diet, the messages were modified to include the elements of eating fruits and vegetables for improving heart health.

The stimulus layout, colors, size, and typeface of each message were replicated across the eight conditions. The changes in the text reflected the accurate information retrieved from the CDC and the AHA websites. For the exercise behavior messages, Riley was chosen as the narrator's name and for the diet behavior message, Pat was chosen as the narrator's name. These names were chosen for the narratives because they were listed as the top 20 gender neutral names in the USA ("The most common," 2015). Gender neutral names were chosen to control for the effect of the narrators' genders on participants' perception of the messages.

The eight conditions were as follows: 1)High threat-high efficacy-barriers addressed; 2) high threat-low efficacy-barriers not addressed; 3)High threat-low efficacy-barriers addressed; 4)Low threat-low efficacy-barriers not addressed; 5)Low threat-low efficacy-barriers addressed; 6)Low threat-high efficacy-barriers not addressed; 7)Low threat-high efficacy-barriers addressed; and 8) Low threat-high efficacy-barriers not addressed (See Appendix A for the narrative messages used for the study).

Procedure

The experiment questionnaire was hosted in the University of Oklahoma (OU)'s Qualtrics online survey portal and linked to Amazon MTurk platform. Before the participants started the online experiment, informed consent approved by OU Institutional Review Board (IRB) was shown. After giving their consent, the participants were randomly assigned to one of the eight-threat x efficacy x barrier conditions. At the beginning of the survey the participants were asked to answer questions about their exercise and eating behaviors. The participants were then asked to read a health narrative about exercising for heart health. After reviewing the message, participants were presented with the self-report questionnaire regarding the narrative presented. When they were finished with the questionnaire, they were asked to read another narrative and complete a self-report questionnaire followed by the message. Finally, they were asked to answer some demographic questions. At the end of the survey, participants were asked to provide the unique code found in the "end of the survey" message to the MTurk portal, as the proof of the survey completion. The average completion time for the study was 8.63 minutes. Participants were paid $0.50 each for taking part in the experiment.

Pre-test

This study had three manipulations: threat (high vs. low), efficacy (high vs. low), and barrier (addressed vs. not addressed). To check the manipulations, a pre-test was conducted. The study recruited 50 participants (28 males, 22 females) online using the Amazon MTurk system. A repeated measure design was implemented where participants were asked to view all four messages (two messages each) for exercise and

healthy diet behaviors. The first message in exercise behavior contained a narrative with high threat and high efficacy, and barrier was addressed. The second message in the exercise behavior included the message that contained low threat and low efficacy, and no barrier was addressed. The diet behavior messages were also similarly manipulated. After viewing each message, the participants were asked to answer the questions about the content of the message.

A set of paired-sample t-tests were conducted to check the message content manipulation for the exercise and healthy diet behavior message.

Threat

In high threat condition, the narrator talked about heart disease as being a severe health condition that can even cause death and admitted that they are at risk of contracting the heart disease. The message also contained the sentence, "Heart disease is the number 1 cause of death for both men and women in the USA." In the low threat message condition, the narrator talked about heart disease as "some health risk." The narrator mentioned that they are not at risk of contracting the heart disease. The sentence about the heart disease being the number 1 cause of death for both men and women in the USA was absent. After reading the message, participants were asked three questions to check the manipulation of threat in the message. The participants were asked to answer based on what they thought about the content of the message and not how they felt about the message. The following questions were asked: "To what extent did the message content describe heart disease as severe?" "To what extent did the message content indicate that one is at risk of heart disease?" and "To what extent did the message contain a health threat?" The first question measured the content of

severity in the message, the second question measured the content of susceptibility in the message and the third question measured the content of health threat in the message. A 7-point Likert-type scale (1-Not at all, 7-Very Much) was used to measure the scales.

Participations reported that message in the high threat condition described heart disease as more severe *(M*=5.42*, SD*=1.56*)* than the message in the low threat condition *(M*=3.80*, SD*=1.81*)*, *t*(49)=5.20, *p*<.001. Participations reported that the message in high threat condition described one as being more at risk of heart disease *(M*=5.54*, SD*=1.59) than the message in the low threat condition *(M*=4.41*, SD*=1.86*)*, *t*(49)=4.26, *p*<.001. Participants reported that the message in the high threat condition contained a health threat *(M*=5.50*, SD*=1.46*)* more than the message in the low threat condition *(M*=3.94*, SD*=1.92*)*, *t*(49)=5.37, *p*<.001. Therefore, the manipulation of the content of threat in the exercise behavior message was successful.

The manipulation of the high and low threat messages in the healthy diet behavior message was similar to the exercise behavior. Participations reported that the message in the high threat condition described heart disease as more severe *(M*=5.50*, SD*=1.50*)* than the message in the low threat condition *(M*=3.84*, SD*=1.77*)*, *t*(49)=5.5, *p*<.001. Participations reported that the message in the high threat condition described one as being more at risk of heart disease *(M*=5.56*, SD*=1.473*)* than the message in the low threat condition *(M*=4.02*, SD*=1.932*)*, *t*(49)=4.232, *p*<.001. Participations reported that the message in the high threat contained a health threat *(M*=5.53*, SD*=1.38*)* more than the message in the low threat condition *(M*=3.88*, SD*=1.763*)*, *t*(48)=5.37, *p*<.001. Therefore, the manipulation of the content of threat in the healthy diet behavior message was successful.

Efficacy

In high efficacy message for the exercise behavior, the narrator talked about being confident that they can walk regularly. The narrator also indicated that walking was effective at improving their heart health. In the low efficacy condition, the narrator doubted that they can walk regularly. The narrator also indicated that they did not believe that walking regularly was effective at improving heart health. After reading the message, participants were asked two questions to check the manipulation of the content of efficacy in the message. The following questions were asked, "To what extent did the message content indicate that one can confidently walk regularly?" and "To what extent did the message content indicate that walking regularly can effectively improve heart health?" A 7-point Likert-type scale (1-Not at all, 7-Very Much) was used to measure the scales. The first question measured the manipulation of the content of self-efficacy in the message. The second question measured the manipulation of the content of response efficacy in the message.

Participations reported that the message in the high efficacy condition indicated that one can confidently walk regularly *(M*=5.52*, SD*=1.70*)* more than the message in the low efficacy condition *(M*=3.02*, SD*=1.87*)*, $t(49)=6.12$, $p<.001$. Participations reported that the message content in the high efficacy condition indicated that walking regularly was effective in improving heart health *(M*=5.96*, SD*=1.32*)* more than the participants in the low efficacy condition *(M*=3.04*, SD*=1.76*)*, $t(49)=7.96$, $p<.001$. Therefore, the manipulation of the content of efficacy in the exercise behavior message was successful.

In the high efficacy message on the healthy diet behavior, the narrator indicated that they were confident about eating healthy by including more fruits and vegetables in their diet. The narrator also mentioned that eating fruits and vegetables was effective in improving heart health. In the low efficacy condition, the narrator indicated that they were confident about being able eat more fruits and vegetables. The narrator also mentioned that they did not believe that eating fruits and vegetables was effective at improving heart health. After reading the message, participants were asked two questions to check the manipulation of the content of efficacy in the message. The following questions were asked: "To what extent did the message content indicate that one can confidently eat fruits and vegetables regularly?" and "To what extent did the message content indicate that eating fruits and vegetables regularly can effectively improve heart health?" A 7-point Likert-type scale (1-Not at all, 7-Very Much) was used to measure the scales. The first question measured the manipulation of the content of self-efficacy in the message. The second question measured the manipulation of the content of response efficacy in the message.

Participations reported that the message content in the high efficacy condition indicated that one can confidently eat fruits and vegetables regularly *(M*=5.66*, SD*=1.64*)* more than the message in the low efficacy condition *(M*=3.06*, SD*=1.74*)*, $t(49)=6.19$, $p<.001$. Participations reported that the message content in high efficacy condition indicated that eating fruits and vegetables was effective in improving heart health *(M*=5.71*, SD*=1.42*)* more than the message in the low efficacy condition *(M=2.98, SD=1.80)*, $t(49)=7.24$, $p<.001$. Therefore, the manipulation of the content of efficacy in the healthy diet behavior message was successful.

Barriers

In the message condition that addressed the barrier of time in the exercise behavior message, the narrator indicated that exercise can be broken down into several 10-minute sessions during the day. This information was not included in the message condition where no barrier was addressed. After reading the message, participants were asked one question to check the manipulation of the content of barrier addressed in the message. The question was: "To what extent did the message content indicate that one can manage time to exercise regularly?" A 7-point Likert-type scale (1-Not at all, 7-Very Much) was used to measure the scale.

Participations reported that the message content in the barrier addressed message condition indicated that one can manage time to exercise regularly *(*M=5.68*,* SD=1.57*)* more than the message in the condition where barrier of time two exercise was not addressed *(*M=2.78*,* SD=1.77*)*, $t(49)=7.62$, $p<.001$. Therefore, the manipulation of the content of barrier in exercise behavior message was successful.

In the message condition that addressed the barrier of time in healthy diet behavior, the narrator indicated that one can cook during the weekend and store pre-portioned fruits and vegetables to eat during the weekdays. This information was not included in the message condition where no barrier was addressed. After reading the message, participants were asked one question to check the manipulation of the content of barrier addressed in the message, "To what extent did the message content indicate that one can cook and eat healthy food regularly despite a busy schedule?" A 7-point Likert-type scale (1-Not at all, 7-Very Much) was used to measure the scale.

Participations reported that the message content in the barrier addressed condition indicated that one can cook and eat healthy food regularly despite a busy schedule *(M*=5.80*, SD*=1.49*)* more than the message condition where no barrier was addressed *(M*=2.78*, SD*=1.79*)*, $t(49)=7.93$, $p<.001$. Therefore, the manipulation of the content of barrier addressed in healthy diet behavior message was successful.

Chapter 5: Result

Main Study

Data Cleaning and Preparation

After finishing the collection, data were downloaded from the Qualtrics portal to an Excel sheet and tabulated. All the identifying information was removed from the data file. The independent variables were dummy coded in accordance to the message conditions. The data was then imported into SPSS 24 software for further cleaning and analysis. A total of 523 responses were collected for the survey. On the first step of data cleaning, participants with no data recorded were removed (n=2). A participant with a large amount of missing data was also removed (n=1). Then the total amount of time that the participants took to finish the survey was analyzed. Participants who took less than 3 minutes (180 seconds) to finish the survey were removed (n=25). A participant who took more than 25 minutes to finish the survey was removed (n=1). The total amount of time that the participant spent reading each story was recorded by Qualtrics. Participants who spent less than 5 seconds in any one of the two message pages were removed (n=46). On the other hand, participants who spent more than 6 minutes in any one of the two message pages was removed (n=3). After cleaning for the missing data and outliers, the total sample size was n=446.

Participants were randomly assigned to one of the eight experimental groups with following number of participants: 1) high threat-high efficacy-barrier addressed; 65 2) high threat-high efficacy-no barrier addressed; 57 3)high threat-low efficacy-barrier addressed; 52 4)high threat-low efficacy-no barrier addressed; 58 5)low threat-high efficacy-barrier addressed; 54 6)low threat-high efficacy-no barrier addressed; 51

7)low threat-low efficacy-barrier addressed; 58, and 8)low threat-low efficacy-no barrier addressed; 51.

The participants' mean for the exercise behavior, which was used as a covariate in the study, was (*M*=2.89, *SD*=1.43) and the participants' mean for the diet behavior was (*M*=4.46, *SD*=1.33). A one-way ANOVA found that there was no significant difference between the participants' report of their exercising behavior before they read the message and their random assignment to the messages with manipulation of threat; $F(1,43)=.57$, $p=.44$; efficacy, $F(1,43)=.50$, $p=.47$; and barrier, $F(1,437)=1.52$, $p=.21$. Furthermore, no significant interaction of threat and barrier; $F(1,437)=1.80$, $p=.18$; threat and efficacy; $F(1,473)=.69$, $p=.40$; or threat, efficacy, and barrier $F(1,437)=.28$, $p=.596$ on exercise behavior was found. However, a significant interaction of barrier and efficacy on exercise behavior was found $F(1,437)=4.98$, $p=.026$. Result further showed that the participants' in the high efficacy and barrier addressed message conditions reported higher exercising behavior (*M*=3.059, *SD*=2.627) than the participants who were in the high efficacy and barrier not addressed message conditions. Also, the participants who were in the low efficacy and barrier addressed message condition reported lower exercising behavior (*M*=2.86, *SD*=1.20) than the participants in the low efficacy and barriers not addressed message conditions (*M*=2.99, *SD*=1.26).

A one-way ANOVA found that there was no significant difference between the participants' report of their eating behavior, which was used as a covariate in the study for healthy diet behavior message, and their random assignment to the messages with manipulation of threat; $F(1,437)=.01$, $p=.920$; efficacy, $F(1,437)=.007$, $p=.93$; and and

barrier, $F(1,437)=.73$, $p=.39$. Furthermore, no significant interaction between threat and barrier; $F(1,437)=.91$, $p=.34$; threat and efficacy; $F(1,473)=2.15$, $p=.14$; barrier and efficacy $F(1,473)=.000$, $p=.99$, or threat, efficacy, and barrier $F(1,437)=.216$, $p=.64$ on eating behavior was found.

A one-way ANOVA found that there was no statistically significant difference between the participants' ages and their random assignment to the messages with manipulation of threat; $F(1,438)=.076$, $p=.78$; efficacy, $F(1,438)=.07$, $p=.97$; and barrier, $F(1,438)=.12$, $p=.72$. Furthermore, there was no significant interaction of threat and barrier; $F(1,438)=.34$, $p=.56$; threat and efficacy; $F(1,478)=1.80$, $p=.18$; barrier and efficacy $F(1,438)=.05$, $p=.82$, and threat, efficacy, and barrier $F(1,438)=1.18$, $p=.23$. Therefore, the participants were randomly assigned to the different conditions of threat, efficacy and barrier despite their ages.

The scale reliability was checked for each item before combining the items into variables. Two of the scales, perceived severity and defensive avoidance had the scale reliability of less than .70. However, the items in the variables were significantly correlated to each other. See Table 1. for details. Then, a correlation matrix was created using the key variables, followed by main analyses. The correlation matrix for exercise behavior message is presented in Table 2. The correlation matrix for healthy diet behavior message is presented in Table 3.

Table 1. Scale Measurement Items and Reliability

Scale	Items	Cronbach α (Exercise/Diet)
Exercise Behavior	"Please indicate how much you exercise on a typical week, Jogging, Fast walking, Swimming, Bicycling, Aerobic Exercise, and Other Exercise" (1-Not at all, 7-Very Much)	.783
Eating Behavior	"Please indicate how much fruits and vegetables you eat on a typical day: Fruits, Vegetables" (1-Not at all, 7-Very Much)	.726
Perceived Fear (Dillard & Peck, 2000)	"I am afraid of heart disease," "I am frightened by heart disease," and "I am scared of heart disease"1- strongly disagree, 7-Strongly Agree)	.974/.975
Perceived Severity (Mirotznik et al., 1995)	"If I develop a heart disease it would be a serious condition/I already have heart disease and if my condition gets worse, it would be a serious condition," and "Heart disease is a severe medical condition."	.596/.634 r=.442***/ r=.477*** $^{***}p$<.001
Perceived Susceptibility (Mirotznik et al., 1995)	"It is likely that someday in the future I will be ill with heart disease," "My present lifestyle puts me at risk of developing heart disease/I already have heart disease, and my lifestyle puts me at risk of aggravating my present condition," and "In comparison to other people, I am more susceptible to developing a serious heart condition." (1-Strongly Disagree, 7-Stronlgy Agree).	.845/.883
Perceived self-efficacy (Richards & Johnson, 2014)	"Exercising for 30 minutes per day 5 days a week during the next month will be easy for me(Eating four to five servings of fruits and vegetables each day will be easy for me," "Exercising for 30 minutes per day 5 days per week during the next month will difficult for me (reversed)," "Exercising for 30 minutes per day 5 days per week during the next month will be inconvenient for me (reversed)," "I am able to exercise for 30 minutes per day 5 days per week during the next month," "I am certain I	.924/.917

	could exercise for 30 minutes per day 5 days per week during the next month," and "If I wanted I could easily exercise for 30 minutes per day 5 days per week during the next month." (1-Strongly Disagree, 7-Strongly Agree).	
Perceived response-efficacy (Richards & Johnson, 2014)	"Engaging in regular exercise (Eating healthy regularly) works in preventing heart disease" and "Engaging in regular exercise is effective in preventing heart disease." (1-Strongly Disagree, 7-Strongly Agree)	.904/.935
Perceived barrier (Mirotznik et al., 1995)	"Exercising (Eating healthy) regularly is costly in terms of time," "It is hard to find the time to exercise regularly," and "Having to exercise regularly interferes with my normal activities" (1-Strongly Disagree, 7-Strongly Agree)	.883/.896
Intention to Exercise (eat healthy) (Richards &Johnson, 2014)	"I intend to exercise for at least 30 min per day, 5 days per week (eat four to five servings of fruits and vegetables each per day) during the next month" and "I will exercise for at least 30 min per day, 5 days per week during the next month" (1-Strongly Disagree, 7-Strongly Agree)	.960/.939
Attitude towards exercise (eating healthy) (Richards & Johnson, 2014)	"Engaging in exercise (Eating four to five serving of fruits and vegetables each per day) during the next month would be good/bad, unwise/wise, and beneficial/not beneficial where "1"= "good" and "7"="bad."	.865/.921
Defensive Avoidance (Witte et al., 1998)	"When I first heard about heart disease, my first instinct was to" want to/not want to think about heart disease and want to/not want to do something to keep myself from getting heart disease where "1"= "not want to" and "7"= "want to"	.527/.594 r=.367***/ r=.431*** $^{***}p$<.001
Issue Derogation (Witte et al., 1998)	"The message was;" "overblown," "exaggerated," or "overstated" where "1"= "not at all overblown" and "7"= "overblown."	.961/.981
Perceived Manipulation (Witte et al., 1998)	"The message was:" "manipulative," "misleading," or "distorted" where	.899/.913

	"1"= "not at all manipulative" and "7"= " manipulative."	
Transportation Exercise (Green &Brock, 2000)	"The story affected me emotionally," "The events in the story are relevant to my everyday life," "and "The events in the story have changed my life." (1-Not at all, 7-Very much)	.725
Transportation Diet (Green &Brock, 2000)	"When I was reading the story, activity going on in the room around me was on my mind (reversed)," "I was mentally involved in the story while reading it," and "I found my mind wandering while reading the story (reversed)."	.722

Table 2. Correlation Matrix of Key Variables (Exercise)

Variables *M(SD)*	1	2	3	4	5	6	7	8	9	10	11
1.Per_Fear 4.57(1.62)	1										
2.Per_Severity 5.46(1.38)	.369**	1									
3.Per_Susceptibility 3.88(1.47)	.421**	.180**	1								
4.Per_Self-Effficacy 4.72(1.52)	-.021	.134**	-.326**	1							
5.Per_Response Efficacy 5.74(1.27)	.105**	.329**	-.065	.223**	1						
6.Per_Barrier 3.79(1.58)	.090	.024	.327**	-.556**	-.112*	1					
7.Intention 4.86(1.71)	.149**	.177**	-.161**	.821**	.183**	-.389**	1				
8.Attitude 6.36(.86)	.149**	.222**	-.010	.293**	.379**	-.183**	.313**	1			
9.Defensive Avoidance 4.93(1.37)	.267**	.048	.078	.228**	.038	-.143**	.297**	.252**	1		
10.Issue Derogation 2.61(1.62)	-.134**	-.188**	.001	-.221**	-.321**	.253**	-.202**	-.375**	-.072	1	
11.Perceived Manipulation	-.119*	-.160**	.067	-.223**	-.329**	.183**	-.216**	-.369**	-.112**	.775**	1

* p <.05, ** p <.01, *** p<.001

Table 3. Correlation Matrix of Key Variables (Diet)

Variables *M(SD)*	1	2	3	4	5	6	7	8	9	10	11
1.Per_Fear 4.60(1.69)	1										
2.Per_Severity 5.57(1.30)	.355**	1									
3.Per_Susceptibility 3.92(1.52)	.410**	.178**	1								
4.Per_Self-Effficacy 5.09(1.41)	-.036	.134**	-.258**	1							
5.Per_Response Efficacy 5.78(1.33)	.112**	.366**	-.016	.302**	1						
6.Per_Barrier 3.19(1.61)	.065	-.165**	.239**	-.582**	-.285**	1					
7.Intention 5.18(1.51)	.072	.146**	-.199**	.804**	.289**	-.435**	1				
8.Attitude 6.40(.963)	.103*	.226**	-.088	.258**	.312**	-.222**	.278**	1			
9.Defensive Avoidance 4.94(1.41)	.270**	.091	.060	.140**	.127**	-.126**	.232**	.204**	1		
10.Issue Derogation 2.54(1.70)	-.124**	-.166**	.100**	-.229**	-.342**	.379**	-.239**	-.352**	-.171**	1	
11.Perceived Manipulation 2.59(1.59)	-.107*	-.144**	.141**	-.219**	-.315**	.344**	-.240**	-.360**	-.160**	.840**	1

* p <.05, ** p <.01, *** p<.001

Testing of Hypotheses

Analysis of covariance (ANCOVA) was used to test the main effects and interactions. Participants' exercise behavior was used as the covariate for the exercise behavior messages and participants' eating behavior was used as the covariate for the healthy diet behavior messages.

Threat Main Effects

Hypothesis 1a predicted that participants who read a high threat message would report higher perceived severity than the participants who read a low threat message. The main effect of threat on perceived severity of heart disease for the exercise behavior was not significant $F(1,442) = .49$, $p = .48$, $\eta^2_{part} = .001$, observed power = .18.

The main effect of threat on participants' perceived severity of heart disease for the healthy diet behavior was not significant, $F(1,442) = 1.81$, $p = .18$, $\eta^2_{part} = .004$, observed power = .27. Therefore, H1a was not supported.

Hypothesis 1b predicted that participants who read a high threat message would report higher perceived susceptibility than the participants who read low threat message. The main effect of threat on perceived susceptibility of heart disease for the exercise behavior was not significant $F(1,442) = .77$, $p = .37$, $\eta^2_{part} = .002$, observed power = .14.

The main effect of threat on perceived susceptibility to heart disease for the healthy diet behavior was not significant, $F(1,442) = .29$, $p = .58$, $\eta^2_{part} = .001$, observed power = .08. Therefore, H1b was not supported.

The main effect of threat on participants' perceived fear of heart disease for the healthy diet behavior was not significant, $F(1,440) = .90$, $p = .34$, $\eta^2_{part} = .002$, observed power = .16. Therefore, H1c was not supported.

Efficacy Main Effects

Hypothesis 2a predicted that the participants who read a high efficacy message would report higher perceived self-efficacy about exercising (and eating healthily) than the participants who read the low efficacy message. The main effect of efficacy on participants' perceived self-efficacy about exercising was not significant, $F(1,436) = .27$, $p = .60$, $\eta^2_{part} = .001$, observed power = .08.

There was a significant main effect of efficacy on participants' perceived self-efficacy for healthy diet behavior, $F(1,442) = 4.07$, $p = .044$, $\eta^2_{part} = .009$, observed power = .52. Results further revealed that the participants in the high efficacy message conditions reported higher self-efficacy for healthy diet behavior (M=5.14, SD=1.38) than the participants in the low efficacy message conditions (M=4.89, SD=1.43). Therefore, H2a was partially supported.

Hypothesis 2b predicted that the participants who read a high efficacy message would report higher perceived response-efficacy about exercising (and eating healthily) than the participants who read the low efficacy message.

The main effect of efficacy on participants' perceived response efficacy about the effectiveness of exercising on improving heart health was not significant, $F(1,442) = .02$, $p = .88$, $\eta^2_{part} = .012$, observed power = .63.

The main effect of efficacy on participants' perceived response efficacy about the effectiveness of eating healthy on improving heart health was not significant, $F(1,442) = .92$, $p = .34$, $\eta^2_{part} = .002$, observed power = .16. Therefore, H2b was not supported.

Barrier Main Effects

Hypothesis 3 predicted that the participants who read the message that addresses the barrier of the amount of time required to exercise (prepare a healthy meal) would report lower perceived barrier than the individuals who read the message that does not address barrier.

The main effect of barrier addressed (or not addressed) on perceived barrier to exercising was not significant, $F(1,442) = 1.23$, $p = .269$, $\eta^2_{part} = .003$, observed power = .20.

The main effect of barrier addressed (or not addressed) on perceived barrier of eating healthy was not significant, $F(1,442) = .01$, $p = .91$, $\eta^2_{part} = .000$, observed power = .05. Therefore, H3 was not supported.

Hypothesis 4 predicted that the participants who are exposed to the message that addresses the barrier to exercise (or prepare healthy meals) would report higher perceived self-efficacy than the participants who are exposed to message not addressing the barrier.

The main effect of barrier addressed (or not addressed) on participants' perceived self-efficacy about exercising was statistically significant, $F(1,442) = 4.21$, $p = .04$, $\eta^2_{part} = .009$, observed power = .53. Results further revealed that the participants in the barrier addressed message condition reported a higher perceived self-efficacy about exercising (M=4.88, SD=1.46) than the participants in the barrier not addressed message condition (M=4.54, SD=1.56).

The main effect of barrier addressed (or not addressed) on perceived self-efficacy about eating a healthy diet was not significant, $F(1,442) = 2.53$, $p = .91$, $\eta^2_{part} = .005$, observed power = .33. Therefore, H4 was partially supported.

Interactions

Hypothesis 5a predicted that the participants who read a high threat and low efficacy message would report higher fear than the participants who read high threat and high efficacy message. The interaction between threat and efficacy on perceived fear about heart disease for exercise behavior was not significant, $F(1, 440) = .11$, $p = .74$, $\eta^2_{part} = .000$, observed power = .06.

The interaction between threat and efficacy on perceived fear of heart disease for the healthy diet was not significant $F(1,440) = .27$, $p = .60$, $\eta^2_{part} = .001$, observed power = .08. Therefore, H5a was not supported.

Hypothesis 5b predicted that the participants who read a high threat and low efficacy message would report more defensive avoidance regarding the exercise (and eating healthily) than the participants who read the high threat and high efficacy message. The interaction between threat and efficacy on defensive avoidance was not significant, $F(1,440) = .01$, $p = .90$, $\eta^2_{part} = .000$, observed power = .05.

The interaction between threat and efficacy on defensive avoidance regarding the message for healthy diet behavior was not significant, $F(1,440) = .18$, $p = .671$, $\eta^2_{part} = .000$, observed power = .07. Therefore, H5b was not supported.

H5c predicted that participants who read the high threat and low efficacy message would report higher issue derogation regarding the messages than the participants who read the high threat and high efficacy message or the low threat and

high efficacy message. The interaction between threat and efficacy on issue derogation regarding the exercise behavior was not significant, $F(1,439) = .33$, $p = .56$, $\eta^2_{part} = .001$, observed power = .09.

The interaction between threat and efficacy on issue derogation regarding the healthy diet was not significant, $F(1, 438) = .73$, $p = .39$, $\eta^2_{part} = .002$, observed power = .14. Therefore, H5c was not supported.

H5d predicted that participants who read a high threat and high efficacy message would report higher perceived manipulation regarding the message than the participants who read a high threat and low efficacy message. The interaction between threat and efficacy on perceived manipulation for exercise was not significant, $F(1,440) = 1.17$, $p = .28$, $\eta^2_{part} = .003$, observed power = .19.

The interaction between threat and efficacy on perceived manipulation for healthy diet was not significant, $F(1,439) = .44$, $p = .50$, $\eta^2_{part} = .001$, observed power = .10. Therefore, H5d was not supported.

Hypothesis 6a predicted that participants who read a high threat and high efficacy message would report more positive attitudes toward exercising (eating healthily) than the participants who read a high threat and low efficacy message. The interaction between threat and efficacy on attitudes toward exercising was not significant, $F(1,435) = 1.35$, $p = .25$, $\eta^2_{part} = .003$, observed power = .21.

The dependent variable, attitude towards eating healthy diet, was transformed to the square root version of the variable. This was done to make the variable approach a normal distribution. The interaction between threat and efficacy on attitudes towards

eating healthily was significant, $F(1,435) = 6.7$, $p = .010$, $\eta^2_{part} = .015$, observed power = .73.

Further, post-hoc tests were done to see if the means were significantly different from each other. Two t-tests was conducted adjusting the alpha at .025.

The difference between the participants in high threat and high efficacy and low threat and high efficacy message conditions was not significant $t(213)=1.80$, $p=.072$. Although not significant, results further revealed that participants in the high threat and high efficacy message conditions had a lower mean ($M = 2.52$, $SD = .25$) than the participants in the low threat and high efficacy message conditions ($M = 2.56$, $SD = .14$).

The difference participants in the high threat and low efficacy and low threat and low efficacy message conditions was not significant $t(160)=-1.99$, p=.048. Although not significant, participants in the low threat and high efficacy message conditions had higher mean ($M = 2.56$, $SD = .14$) than the participants in the low threat and low efficacy message conditions ($M = 2.47$, $SD = .32$).

A statistically significant main effect of efficacy was found on the attitude towards eating a healthy diet, $F(1,435) = 3.95$, $p = .047$, $\eta^2_{part} = .009$, observed power = .51. Results further revealed that participants in the high efficacy message conditions had a more positive attitudes towards eating a healthy diet ($M = 2.56$, $SD = .14$) than the participants in the low efficacy message conditions ($M = 2.47$, $SD = .14$). Therefore, H6a was not supported.

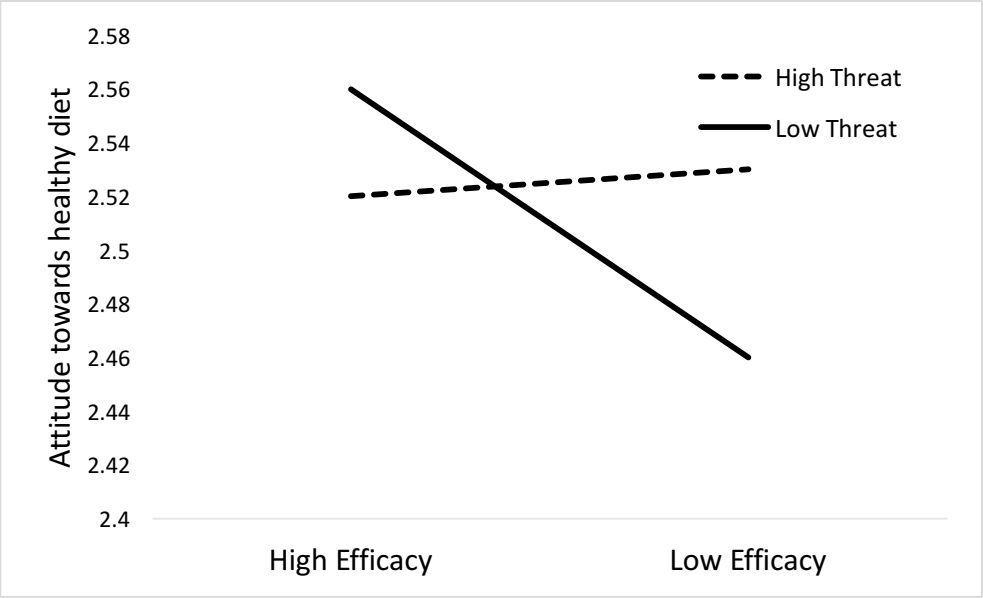

Figure 1. Interaction between Threat and Efficacy on Attitude towards Eating a Healthy Diet

Hypothesis 6b predicted that the participants who read a high threat and high efficacy message would report greater intentions to exercise (eating healthily) than the participants who read a high threat and low efficacy message. The interaction between threat and efficacy on participants' intentions to exercise was not significant, $F(1,436) = .33$, $p = .57$, $\eta^2_{part} = .001$, observed power = .09.

The interaction between threat and efficacy on intentions to eat healthily was not significant, $F(1,436) = .005$, $p = .94$, $\eta^2_{part} = .000$, observed power = .05. Therefore, H6b was not supported.

Hypothesis 7 predicted that the participants who read a high threat message that addresses the barrier to exercise (and eating healthily) would report higher self-efficacy regarding exercise (and eating healthily) than the participants who read a high threat message that does not address the barrier. The interaction between threat and efficacy

on perceived self-efficacy for exercise behavior was not significant, $F(1,436) = .88$, $p = .35$, $\eta^2_{part} = .002$, observed power = .15.

The interaction between threat and barrier on perceived self-efficacy for eating healthily was not significant, $F(1, 436) = .91$, $p = .34$, $\eta^2_{part} = .002$, observed power = .16. Therefore, H7 was not supported.

Hypothesis 8a predicted that the participants who read a high threat message that addresses the barrier would have more positive attitudes about exercising (eating healthy) than the participants who read the high threat message that does not address the barrier to exercising.

The interaction between threat and barrier on attitudes towards exercise was not significant, $F(1,435) = 1.46$, $p = .23$, $\eta^2_{part} = .003$, observed power = .23.

The interaction between threat and barrier on attitude towards eating healthily was not significant, $F(1,435) = .23$, $p = .64$, $\eta^2_{part} = .000$, observed power = .07. Therefore, H8a was not supported.

Hypothesis 8b predicted that the participants who read a high threat message that addresses the barrier to exercise would have higher intentions to exercise than the participants who read the high threat message that does not address the barrier to exercising.

The interaction between threat and barrier on intentions to exercise was not significant $F(1,436) = 1.09$, $p = .29$, $\eta^2_{part} = .002$, observed power = .18.

The interaction between threat and barrier on intention to eating healthily was not significant, $F(1, 436) = .04$, $p = .83$, $\eta^2_{part} = .000$, observed power = .05. Therefore, H8b was not supported.

Hypothesis 9a predicted that the participants who read a high threat and high efficacy message that addresses the barrier would have the most positive attitudes towards exercising (eating healthily) than other conditions.

The three-way interaction of threat, efficacy, and barrier on attitude towards exercise was not significant., $F(1,435) = .09$, $p = .76$, $\eta^2_{part} = .000$, observed power = .06. See Table 4. for details on means for main and interaction effects of threat, efficacy, and barrier on attitude towards exercise.

However, results showed that there was a significant two-way interaction between barrier and efficacy on the participants' attitudes towards exercise, $F(1,435) = 4.35$, $p = .038$, $\eta^2_{part} = .01$, observed power=.55. See Figure 2.

Further, post-hoc tests were done to see if the means were significantly different from each other. Two t-tests were conducted adjusting the alpha at .025.

The difference between participants in high efficacy and barrier not addressed and high efficacy and barrier addressed message conditions was not significant $t(212)=1.80$, $p=.073$.

Results further revealed that participants in the high efficacy and barrier not addressed conditions had a higher mean ($M = 6.53$, $SD = .62$) than the participants in the high efficacy and barrier addressed message conditions ($M = 6.35$, $SD = .88$).

The difference between the participants in the low efficacy and barrier addressed and low efficacy and barrier not addressed message conditions was not significant $t(217)=.362$, $p=.294$.

Results further revealed that participants in the low efficacy and barrier addressed conditions had a higher mean (M = 6.40, SD =.88) than the participants in the low efficacy and barrier not addressed message conditions (M = 6.27, SD = .96).

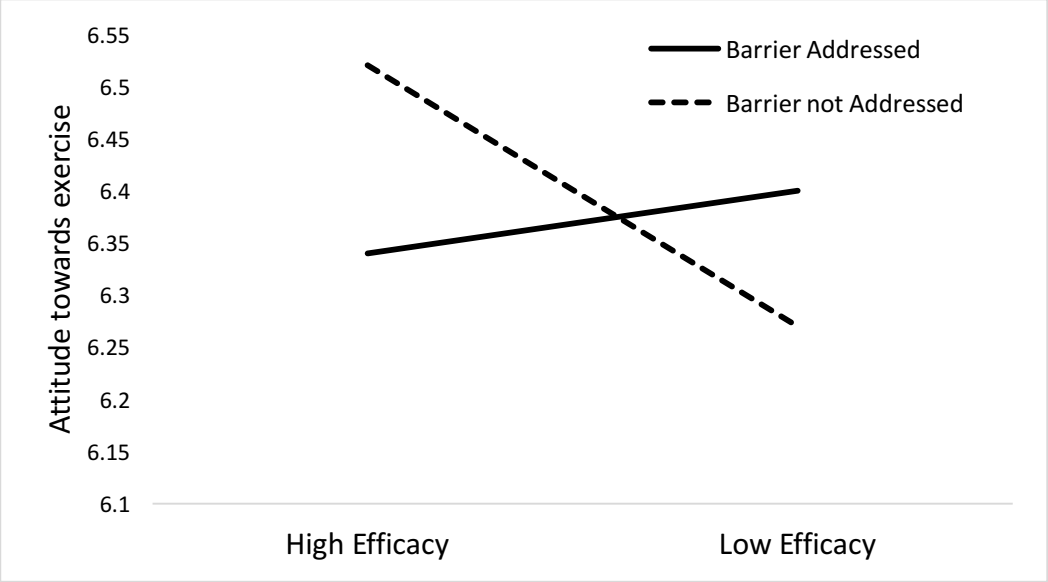

Figure 2. Interaction between Efficacy and Barrier on Attitude towards Exercise

The three-way interaction of threat, efficacy, and barrier on attitudes towards eating healthily was not significant, $F(1, 435) = 1.09$, $p = .29$, $\eta^2_{part} = .002$, observed power = .18. Therefore, H9a was not supported. See Table 5. for details on means for main and interaction effects of threat, efficacy, and barrier on attitude towards eating healthy diet.

Hypothesis 9b predicted that the participants who read a high threat and high efficacy message that addresses the barrier would have the highest intentions to exercise (and eat healthily) than the participants in other message conditions.

The three-way interaction of threat, efficacy, and barrier on intentions to exercise was not significant, $F(1,436) = .08$, $p = .77$, $\eta^2_{part} = .000$, observed power = .06. However, the main effect of barrier on intention to exercise was approaching significance, $F(1,436) = 3.06$, $p = .084$., $\eta^2_{part} = .007$, observed power = .41.

Results further revealed that participants in barrier addressed message conditions reported more positive attitudes to exercise (M=5.01, SD=1.66) than participants in barrier not addressed message conditions (M=4.69, SD=1.75). See Table 6. for details on means for main and interaction effects of threat, efficacy, and barrier on intention to exercise.

The three-way interaction of threat, efficacy, and barrier on intentions to eat healthily was not significant, $F(1,436) = .65$, $p = .42$, $\eta^2_{part} = .001$, observed power = .13. Therefore, H9b was not supported. See Table 6. for details on means for main and interaction effects of threat, efficacy, and barrier on intentions to eat healthy diet.

Research Question 1 asked: Will the participants' reports of transportation to the narrative world vary among the manipulations of threat, efficacy, and barriers in the message? The main effect of efficacy on participants' report of transportation to the narrative world for the exercise behavior approached significance, $F(1,436)=3.1$, $p = .079$, $\eta^2_{part} = .007$, observed power = .42.

Results further revealed that participants in the high efficacy message conditions reported greater transportation to the narrative world ($M = 3.95$, $SD = 1.40$) than the participants in the low efficacy message conditions ($M = 3.74$, $SD = 1.5$). The main effect of barrier on participants' report of transportation to the narrative world for the

exercise behavior approached significance, $F(1,436)=2.84$, $p = .09$, $\eta^2_{part} = .006$, observed power = .39.

Results further revealed that participants in the barrier not addressed message conditions reported greater transportation to the narrative world ($M = 3.93$, $SD = 1.49$) than the participants who were exposed to the barrier addressed message conditions ($M = 3.76$, $SD = 1.41$). See Table 7. for details on means for main and interaction effects of threat, efficacy, and barrier on participants' transportation to the narrative world for exercise behavior.

No significant main effects and interactions of threat, efficacy, and barrier on transportation to the narrative world for the healthy diet behavior message were found.

Research Question 2 asked: Will the participants' identification with the character of the narrative vary among the manipulations of threat, efficacy, and barriers in the message? There was significant main effect of efficacy on identification with the character of the narrative for exercise behavior, $F(1,436)=19.22$, $p =<.001$, $\eta^2_{part} = .04$, observed power = .99.

Results further revealed that participants in the high efficacy message condition reported greater identification with the character in the narrative ($M = 4.15$, $SD = 1.25$) than the participants who were exposed to the low efficacy message conditions ($M =3.62$, $SD = 1.33$). See Table 8. for details on means for main and interaction effects of threat, efficacy, and barrier on participants' identification with the character of the narrative for the healthy diet behavior message.

The main effect of efficacy on participants' reports of identification with the character of the narrative for healthy eating behavior was statistically significant, $F(1,436)=24.62$, $p =<.001$, $\eta^2_{part} = .05$, observed power = .999.

Results further revealed that participants in the "high efficacy" message condition reported greater identification with the character in the narrative ($M = 4.20$, $SD = 1.28$) than the participants who were exposed to the "low efficacy" message condition ($M =3.57$, $SD = 1.44$). See Table 9. for details on means for main and interaction effects of threat, efficacy, and barrier on participants' identification with the character of the narrative for the healthy diet behavior message.

See Appendix E for the ANCOVA summary tables.

Table 4. Descriptive Statistics for Attitude towards Exercise

Barrier	Efficacy	Threat	*Mean*	*SD*	*N*
Not Addressed	Low	Low	6.26	1.05	51
		High	6.28	.88	57
		Total	6.27	.96	108
	High	Low	6.59	.53	50
		High	6.47	.68	57
		Total	6.52	.62	107
	Total	Low	6.42	.85	101
		High	6.37	.79	114
		Total	6.40	.82	215
Addressed	Low	Low	6.28	1.02	58
		High	6.54	.66	52
		Total	6.40	.87	110
	High	Low	6.33	.93	54
		High	6.36	.85	65
		Total	6.35	.88	119
	Total	Low	6.31	.98	112
		High	6.44	.77	117
		Total	6.37	.88	229
Total	Low	Low	6.27	1.03	109
		High	6.40	.79	109
		Total	6.34	.92	218
	High	Low	6.45	.78	104
		High	6.41	.78	122
		Total	6.43	.77	226
	Total	Low	6.36	.92	213
		High	6.41	.78	231
		Total	6.39	.85	444

Table 5. Descriptive Statistics for Attitude towards Healthy Diet

Threat	Efficacy	Barrier	*Mean*	*SD*	*N*
Low	Low	Not Addressed	2.42	.36	51
		Addressed	2.50	.27	58
	Low	Total	2.46	.32	109
	High	Not Addressed	2.57	.14	50
		Addressed	2.55	.14	54
Low	High	Total	2.56	.14	104
High	Total	Not Addressed	2.50	.28	101
		Addressed	2.52	.21	112
	Total	Total	2.51	.25	213
	Low	Not Addressed	2.53	.17	57
		Addressed	2.54	.15	52
	Low	Total	2.53	.16	109
	High	Not Addressed	2.52	.21	57
		Addressed	2.51	.19	65
High	High	Total	2.52	.20	122
Total	Total	Not Addressed	2.52	.19	114
		Addressed	2.52	.18	117
	Total	Total	2.52	.18	231
	Low	Not Addressed	2.48	.28	108
		Addressed	2.52	.22	110
	Low	Total	2.50	.25	218
	High	Not Addressed	2.55	.18	107
		Addressed	2.53	.17	119
Total	High	Total	2.54	.18	226
	Total	Not Addressed	2.51	.24	215
		Addressed	2.52	.19	229
	Total	Total	2.52	.22	444

Table 6. Descriptive Statistics for Intention to Exercise

Threat	Efficacy	Barrier	*Mean*	*SD*	*N*
Low	Low	Not Addressed	4.32	1.85	51
		Addressed	5.04	1.58	58
		Total	4.70	1.74	109
	High	Not Addressed	4.66	1.72	51
		Addressed	5.09	1.52	54
		Total	4.88	1.63	105
	Total	Not Addressed	4.49	1.78	102
		Addressed	5.06	1.55	112
		Total	4.79	1.68	214
High	Low	Not Addressed	4.80	1.83	57
		Addressed	4.90	1.72	52
		Total	4.85	1.77	109
	High	Not Addressed	4.92	1.60	57
		Addressed	5.02	1.82	65
		Total	4.97	1.71	122
	Total	Not Addressed	4.86	1.71	114
		Addressed	4.97	1.77	117
		Total	4.92	1.74	231
Total	Low	Not Addressed	4.58	1.85	108
		Addressed	4.97	1.65	110
		Total	4.78	1.76	218
	High	Not Addressed	4.80	1.65	108
		Addressed	5.05	1.68	119
		Total	4.94	1.67	227
	Total	Not Addressed	4.69	1.75	216
		Addressed	5.01	1.66	229
		Total	4.85	1.71	445

Table 7. Descriptive Statistics for Intention to Eat Healthy Diet

Threat	Barrier	Efficacy	*Mean*	*SD*	*N*
Low	Not Addressed	Low	4.77	1.57	51
		High	5.21	1.65	51
		Total	4.99	1.61	102
	Addressed	Low	5.21	1.39	58
		High	5.31	1.30	54
		Total	5.26	1.34	112
	Total	Low	5.00	1.48	109
		High	5.26	1.47	105
		Total	5.13	1.48	214
High	Not Addressed	Low	5.10	1.47	57
		High	5.11	1.69	57
		Total	5.10	1.57	114
	Addressed	Low	5.21	1.64	52
		High	5.43	1.39	65
		Total	5.33	1.50	117
	Total	Low	5.15	1.55	109
		High	5.28	1.54	122
		Total	5.22	1.54	231
Total	Not Addressed	Low	4.94	1.52	108
		High	5.15	1.66	108
		Total	5.05	1.59	216
	Addressed	Low	5.21	1.51	110
		High	5.38	1.34	119
		Total	5.29	1.427	229
	Total	Low	5.08	1.52	218
		High	5.27	1.51	227
		Total	5.18	1.51	445

Table 8. Descriptive Statistics for Transportation to Narrative World

Threat	Efficacy	Barrier	*Mean*	*SD*	*N*
Low	Low	Not Addressed	3.87	1.63	51
		Addressed	3.47	1.36	58
		Total	3.65	1.50	109
	High	Not Addressed	3.88	1.43	51
		Addressed	3.83	1.36	54
		Total	3.85	1.39	105
	Total	Not Addressed	3.87	1.53	102
		Addressed	3.64	1.37	112
		Total	3.75	1.45	214
High	Low	Not Addressed	4.03	1.53	57
		Addressed	3.60	1.43	52
		Total	3.83	1.49	109
	High	Not Addressed	3.93	1.39	57
		Addressed	4.13	1.41	65
		Total	4.04	1.40	122
	Total	Not Addressed	3.98	1.46	114
		Addressed	3.90	1.44	117
		Total	3.94	1.44	231
Total	Low	Not Addressed	3.95	1.57	108
		Addressed	3.53	1.39	110
		Total	3.74	1.49	218
	High	Not Addressed	3.90	1.40	108
		Addressed	3.99	1.39	119
		Total	3.95	1.40	227
	Total	Not Addressed	3.93	1.49	216
		Addressed	3.77	1.41	229
		Total	3.85	1.45	445

Table 9. Descriptive Statistics for Identification with the Narrative (Exercise)

Threat	Barrier	Efficacy	*Mean*	*SD*	*N*
Low	Not Addressed	Low	3.66	1.45	51
		High	4.15	1.42	51
		Total	3.91	1.45	102
	Addressed	Low	3.58	1.39	58
		High	4.21	1.28	54
		Total	3.89	1.37	112
	Total	Low	3.62	1.41	109
		High	4.18	1.35	105
		Total	3.90	1.41	214
High	Not Addressed	Low	3.58	1.24	57
		High	3.91	1.29	57
		Total	3.74	1.27	114
	Addressed	Low	3.65	1.27	52
		High	4.31	1.03	65
		Total	4.02	1.18	117
	Total	Low	3.62	1.25	109
		High	4.12	1.17	122
		Total	3.88	1.23	231
Total	Not Addressed	Low	3.62	1.34	108
		High	4.02	1.35	108
		Total	3.82	1.36	216
	Addressed	Low	3.62	1.33	110
		High	4.26	1.153	119
		Total	3.95	1.28	229
	Total	Low	3.62	1.33	218
		High	4.15	1.25	227
		Total	3.89	1.32	445

Table10. Descriptive Statistics for Identification with the Narrative (Diet)

Threat	Barrier	Efficacy	*Mean*	*SD*	*N*
Low	Not Addressed	Low	3.57	1.48	51
		High	4.28	1.48	51
		Total	3.93	1.51	102
	Addressed	Low	3.49	1.49	58
		High	4.26	1.17	54
		Total	3.86	1.39	112
	Total	Low	3.53	1.47	109
		High	4.27	1.32	105
		Total	3.89	1.44	214
High	Not Addressed	Low	3.49	1.38	57
		High	3.96	1.29	57
		Total	3.73	1.35	114
	Addressed	Low	3.73	1.45	52
		High	4.36	1.18	65
		Total	4.08	1.34	117
	Total	Low	3.60	1.41	109
		High	4.17	1.24	122
		Total	3.91	1.35	231
Total	Not Addressed	Low	3.53	1.42	108
		High	4.11	1.38	108
		Total	3.82	1.43	216
	Addressed	Low	3.60	1.47	110
		High	4.32	1.17	119
		Total	3.97	1.36	229
	Total	Low	3.57	1.44	218
		High	4.22	1.28	227
		Total	3.90	1.40	445

Table 11. Summary Table for Hypotheses and Research Questions

	Predicted Relationship	Outcome
H1a	Main effect of threat on participants' perceived severity of heart disease.	Not supported
H1b	Main effect of threat on participants' perceived susceptibility of heart disease.	Not supported
H1c	Main effect of threat on participants' perceived fear of heart disease.	Not supported
H2a	Main effect of efficacy on participants' perceived self-efficacy about exercising behavior (eating healthy).	**Supported for healthy diet behavior**
H2b	Main effect of efficacy on participants' perceived response efficacy about exercise behavior.	Not supported
H3	Main effect of barrier on participants' perceived barrier	Not supported
H4	Main effect of barrier on perceived self-efficacy	**Supported for exercise behavior**
H5a	Interaction between threat and efficacy on participants' perceived fear of heart disease.	Not supported
H5b	Interaction between threat and efficacy on participants' report of defensive avoidance regarding the message.	Not supported.
H5c	Interaction between threat and efficacy on participants' report of perceived manipulation regarding the message.	Not supported.
H5d	Interaction between threat and efficacy on participants' report of issue derogation regarding the message.	Not supported.
H6a	Interaction between threat and efficacy on participants' attitudes towards exercising (eating healthy).	Not Supported. **Interaction found but not in predicted direction (for healthy diet behavior).**
H6b	Interaction between threat and efficacy on participants' intentions to exercise (eat healthy diet).	Not supported
H7	Interaction between threat and barrier on participants' perceived self-efficacy about exercising (eating healthy)	Not supported.
H8a	Interaction between threat and barrier on participants' attitudes towards exercising (eating healthy).	Not supported
H8b	Interaction between threat and barrier on participants' intentions to exercise (eat healthy).	Not supported
H9a	Three-way interaction of threat, efficacy, and barrier on participants' attitudes towards exercise (eating healthy diet)	Not supported. **A significant two-way interaction between**

		barrier and efficacy on participants' attitude towards exercise was found.
H9b	Three-way interaction of threat, efficacy, and barrier on participants' intentions to exercise (eat healthy).	Not supported. **Main effect of barrier on participants' intentions to exercise approached significance.**
RQ1.	Will the participants' report of transportation to the narrative world vary among the manipulations of threat, efficacy, and barrier in the message?	**Main effect of efficacy and barrier approached significance for exercise behavior.**
RQ2.	Will the participants' report of transportation to the narrative world vary among the manipulations of threat, efficacy, and barrier in the message?	**Main effect of efficacy on participants' report of identification with the narrative character was found for both the exercise and healthy diet behaviors.**

Chapter 6: Discussion

The purpose of the current study was to extend the Extended Parallel Process Model (EPPM) by adding the concept of perceived barrier from Health Belief Model (HBM). Specifically, this research investigated the role of threat, efficacy, and barrier on participants' attitudes and intentions towards exercising and eating a healthy diet to improve their heart health. EPPM includes the concepts of fear, efficacy, and threat but neglects the concept of perceived barrier, which is included in HBM. Meta-analyses of HBM have shown that perceived barrier is one of the strongest predictors of health behaviors (Carpenter, 2010; Janz & Becker, 1984). A meta-analysis on fear appeal messages has also suggested that in order to increase the perception of self-efficacy, practitioners should identify the barriers that act as hindrances for an individual to perform the recommended action (Witte & Allen, 2000). Therefore, the present study examined if adding the concept of barrier in EPPM would persuade individuals to follow the recommended health behaviors.

The current study manipulated threat (high vs. low), efficacy (high vs. low), and barrier (addressed vs. not addressed) as independent variables. The study used narratives as message stimuli with manipulated variables. The pre-test indicated that the manipulations of all three independent variables were successful. Discussions of the hypothesized relationships are presented in the following sections.

Influence of Threat

It was hypothesized that participants exposed to high threat message conditions would report higher perceived severity, higher perceived susceptibility, and higher perceived fear than the participants exposed to low threat message conditions. However,

no main effect of threat on perceived severity, perceived susceptibility, and perceived fear was found for either exercise or healthy diet behaviors. One reason can be that a majority of participants (94.8%) reported that they had not been diagnosed with heart disease, although more than half of the participants (57%) reported that they had a close family member who has been diagnosed with heart disease. One possible explanation is that people have optimistic bias and believe that they are less likely to be affected by a risk than others (Weinstein, 1989). The optimistic bias on self was found in a study that assessed the predictors of influenza vaccine acceptance among healthy adults (Chapman & Coups, 1999). Chapman and Coups found that one of the reasons that people declined to be vaccinated against flu was their perception that they were at low risk of getting the flu. Optimistic biases may hinder risk-reducing behaviors such that people believe they are less susceptible to disease conditions and do not take the health messages seriously (Chapman & Coups, 1999). This may have led the participants in the current study to believe that heart disease is not so severe and they are not at risk of heart disease despite being sedentary or their unhealthy eating habits. The participants of the current study reported that they are less physically active regularly than the regular consumers of fruits and vegetables.

Influence of Efficacy

The main effect of efficacy on both perceived self-efficacy and response efficacy was not found for the exercise behavior messages. However, a main effect of efficacy on participants' perceived self-efficacy was found for the healthy diet behavior messages. Participants in the high efficacy message conditions reported higher self-efficacy about eating a healthy diet than the participants in the low efficacy message

conditions. But the main effect of the efficacy on participants' perceived response efficacy was not found for the healthy diet behavior message either. According to the results, the participants were confident that they would be able to eat more fruits and vegetables, but they were not confident that they would be able to exercise regularly. One explanation is that eating healthy might be perceived as easier than exercising. To exercise, one has to actually get up and do something. Even something as simple as walking takes effort to get out of the house and walk or at least get up from the couch and walk (if they choose to walk inside the house). However, it may be easier to buy more fruits and vegetables from the grocery store instead of buying less healthy food such as chips and drinks. Another explanation is that self-efficacy is one's confidence of being able to perform a certain behavior, which can be considered as an individual's internal character and not dependent largely upon the exposure to a single persuasive message (Lewis, Watson & White, 2010). As mentioned earlier, the participants' reports of healthy eating behavior was higher than the participants' reports of exercise behavior before they were exposed to different message conditions. Therefore, being exposed to the narrative might have increased the participants' self-confidence of being able to eat healthier, whereas a single narrative on exercise may not have been able to increase their self-confidence of exercising regularly.

The perceived response efficacy for both the exercise and healthy diet behavior were not significant. One explanation is that the message indicated that exercising or eating healthy foods could improve heart health. Although these behaviors are two of the factors for improving cardiovascular health, there are many other factors that can cause heart disease such as smoking, second-hand smoke, heavy alcohol consumption,

and lack of sleep ("Heart Disease," 2015; Peker, Hedner, Norum, Kraiczi, & Carlson, 2002). The messages did not consider those factors and mentioned a single factor per message as being effective in improving heart health. Therefore, the participants may not have been convinced that these behaviors were enough to improve heart health. Another reason for result may be the participants' belief that they are healthy enough and are not susceptible to heart disease yet. The average age of the participants for the current study was 40 years who may not be thinking that they are at risk of heart disease.

Influence of Barrier

The main effect of barrier addressed (not addressed) on perceived barrier was not significant for either the exercise or healthy diet behavior messages. The hypothesis predicted that the participants exposed to the barrier addressed message conditions would report lower perceived barrier than the participants exposed to the barrier not addressed message conditions. Although the mean for perceived barrier was in the predicted direction for both the exercise and heathy diet behavior messages , they were not statistically significant. This finding is in line with a study where the food features such as price, taste, ease of preparation, and convenience did not have a significant influence on perceived barrier of participants to eat healthy diet (Deshpande, Basil & Basil, 2009).

The current study addressed the barrier of time for exercising and eating healthy diet. However, other factors or barriers of exercising and eating a healthy diet were not addressed in this study. People have reported several barriers of eating healthy diet such as taste, convenience of buying healthy food, and the cost of fruits and vegetables

(Deshpande, Basil & Basil, 2009; John & Ziebland, 2004; Mahalik & Burns, 2011). For the exercise behaviors, factors such as inaccessibility of exercise facilities and cost of using them, weather, physical pain, fatigue, and lack of motivation have been reported as perceived barriers (Booth et al., 1997; Kasser & Kosma, 2012; Wilcox et al., 2006). But the current study only concentrated on addressing the barrier of time, which may not have been sufficient for the participants to significantly decrease their perceived barrier.

The study also hypothesized that the participants exposed to the barrier addressed message condition would report higher self-efficacy than the participants exposed to barrier not addressed message conditions. As hypothesized, a statistically significant effect of barrier addressed on participants' self-efficacy was found for exercise behavior. The literature on HBM and EPPM has suggested that the perceived barrier must be addressed to help increase the self-efficacy of individuals regarding health behaviors (Hosseini et al., 2017; Witte & Allen, 2000). The current study showed that addressing barrier can increase the self-efficacy of individuals for exercise behavior. However, the result was not replicated for healthy diet behavior messages. Addressing the barrier of time did not increase the self-efficacy of individuals for healthy diet behaviors. However, the means were in the predicted direction, showing that the participants in the barrier addressed message condition had a higher mean on perceived self-efficacy than the participants in the barrier not addressed message conditions.

One reason may be the other barriers that were not addressed for healthy eating. A frequently mentioned barrier to eating healthily has been taste (Kearney &

McElhone, 1999; Lappalainen et al., 1997). Although people know that eating fruits and vegetables is healthy, they may not have the confidence to do so because of their lack of desire to give up the food they like (Kearey & McElhoe, 1999). Another barrier to eating more fruits and vegetables can be cost (John & Ziebland, 2004; Pawlak & Colby, 2009). Participants may not be confident that they will be able to eat healthily because they may not afford to eat fruits and vegetables every day.

Interactions between Threat and Efficacy

The current study hypothesized (H5a-d) that participants who read a high threat and low efficacy message would report higher perceived fear, higher defensive avoidance, higher issue derogation, and higher perceived manipulation than the participants who read a high threat and high efficacy message. However, none of the hypotheses were supported for either exercise or healthy diet behavior. The study failed to support the fear control process of EPPM. This finding contrasts the findings of previous studies where high fear and low efficacy has led to fear control processes (Witte, 1994, 1998;). However, a systematic analysis of EPPM examined the constructs, propositions, and assumptions of the EPPM (Popova, 2012). The analysis concluded that there is a mixed result for the proposition that increased threat perception and decreased efficacy perception leads to defensive avoidance, issue derogation, and perceived manipulation regarding the message. A study by Witte et al. (1993) found that the farmers with low efficacy and low threat perceptions reported the most defensive avoidance, manipulative intent perceptions, and derogated safety issue. The current study used narratives as message stimuli. This may have had an effect on the result for the fear control process because the transportation to the narrative world and

identification with the character may have elicited less defensive reactions (DeWit, Das, & Vet, 2008).

Hypothesis 6a predicted the interaction between threat and efficacy where high threat and high efficacy messages would lead to more positive attitudes towards exercising (eating healthily) than high threat and low efficacy messages. The result found no significant interaction between threat and efficacy on attitudes for the exercise behavior messages. This finding is consistent with the meta-analysis by Allen and Witte (2000) that did not find a significant interaction between threat and efficacy on the persuasive impact of the message. The meta-analysis only found significant main effects of both threat and efficacy on persuasive impact of the message. Although the original EPPM predicts the interaction between threat and efficacy on fear control and danger control processes, studies have found that fear and efficacy may be working independently of each other (Rokos-Ewoldsen, Yu & Rhodes, 2004; Witte & Allen, 2000). Rokos-Ewoldesn et al. (2004) found that a high threat message led to the fear control processes regardless of efficacy and the high efficacy message led to the danger control process regardless of threat.

The current study found a significant interaction between threat and efficacy on participants' attitudes towards healthy diet behavior. However, the interaction was not in the predicted direction. Post-hoc tests found that difference between the participants in high threat and high efficacy and low threat and high efficacy message conditions were not significant. However, participants in high threat and high efficacy message conditions had less positive attitudes towards eating a healthy diet than participants in low threat and high efficacy message conditions.A significant main effect of efficacy on

attitude towards eating a healthy diet was found where participants exposed to high efficacy message conditions reported more positive attitude towards healthy diet than participants exposed to low efficacy message conditions.

One possible explanation of this result is that efficacy may be the driving force to convince the individuals to engage in exercise and healthy eating behaviors rather than threat. Although people may have knowledge about the negative consequences of eating unhealthily on their heart health, they may not eat healthily because of lack of confidence or lack of belief that such behaviors will be effective in improving their heart health. Therefore, a low threat and high efficacy message may be more persuasive for healthy eating behavior than a high threat message. The results are not consistent with the EPPM but they are consistent with the findings of Rokos-Ewoldesn et al. (2004) that participants who were exposed to a high efficacy message had a more positive attitude toward the adaptive behavior regardless of the level of threat contained in the message.

Hypothesis 6b predicted that participants who read a high threat and high efficacy message would report higher intentions to exercise (eat healthily) that the participants who read a high threat and low efficacy message. However, no significant interaction between threat and efficacy was found on participants' intentions to either exercise or eat healthy foods. Further, no significant main effect of threat or efficacy was found for either participants' intentions to either exercise or eat healthy foods. The means suggested that, although not significant, for both the exercising and healthy eating message conditions, the participants in the high threat and high efficacy message conditions had the greatest intentions to exercise and eat healthy followed by low threat

and high efficacy, high threat and low efficacy, and low threat and low efficacy message conditions. Although the interaction between threat and efficacy was not significant, the means were in the predicted direction, where the high threat and high efficacy message conditions produced the greatest intentions to exercise (eat healthily).

Several studies have found the interaction between threat and efficacy on participants' intentions to perform the recommended behavior (Basil et al., 2013; Mormon, 2000; Smalec & Klingle, 2000; Witte, 1994; Yun, Kim & Berry, 2014). However, some studies have failed to find an interaction between threat and efficacy on the intention to follow the recommended action (Witte et al., 1993; Wong & Cappella, 2009). Wong and Cappella (2009) found that there was a significant interaction between threat and efficacy on the participants' intentions to seeking help for quitting smoking, but no significant interaction was found for the intentions to quit smoking. Witte et al. (1993) found no significant interaction between threat and efficacy on the intentions of the farmers to adopt safety measures while using farm equipment.

One reason for the current result might be the unwillingness of the participants to change their lifestyle. Both exercising and healthy eating require changes in the current lifestyle and a long term commitment for those behaviors to show some results in people's health, which may be something that people are reluctant to do. The research on exercise and healthy eating behaviors using the framework of EPPM is still scant. More research on exercise and healthy eating behaviors using the EPPM framework is required to understand how threat and efficacy play a role in influencing the attitudes and behavioral intentions of the individuals towards exercise and eating healthily.

Interactions between Threat and Barrier

Hypothesis 7 predicted that there would be an interaction between threat and barrier on perceived self-efficacy, such that participants in high threat and barrier addressed message conditions would have higher perceived self-efficacy about exercising (and eating healthily) than the participants in high threat and barrier not addressed message conditions. However, no significant interaction was found between threat and barrier on perceived self-efficacy. The means, however, showed that the perceived self-efficacy was higher for high threat and barrier addressed message conditions than high threat and barrier not addressed message conditions for both the exercise and healthy eating behaviors. As mentioned earlier, one reason may be that the study addressed the barrier of time only. This may not have been sufficient to increase the self-efficacy of the individuals regarding exercising or eating healthy foods. If more than one barrier was addressed, such as taste for food and lack of motivation for exercising along with the barrier of time, then self-efficacy might have improved despite a high threat message. The HBM studies have found a main effect of perceived barrier on attitude, intention, and behavior of individuals (Becker et al., 1997; Carpenter, 2010; Champion, 1990). Although no significant interaction between barrier and threat on perceived self-efficacy was found in the current study, it should not be concluded that addressing barrier does not improve individuals' perceived self-efficacy. Therefore, future studies should examine if there are interaction effects of threat and barrier on the perceived self-efficacy of individuals for performing recommended health behaviors.

Hypothesis 8(a-b) predicted that there would be an interaction between threat and barrier on the attitude and intention to exercise and eat a healthy diet, such that the participants exposed to high threat and barrier addressed message conditions would have more positive attitudes and higher intentions to exercise and eat a healthy diet that those exposed to the high threat and barrier not addressed message conditions. However, no significant interaction between threat and barrier on attitudes or intentions to exercise or eat healthily was found. Although not significant, the means showed that the intentions towards exercising and eating healthily were in the predicted direction such that participants exposed to high threat and barrier addressed message conditions had a higher means for intention to exercise and eat healthily than the participants who were exposed to high threat and barrier not addressed message conditions. However, for the attitudes towards eating healthy diet, the participants in the high threat and barrier not addressed message conditions had higher means on the intentions to exercise than the participants in the high threat and barrier addressed message conditions.

Although no significant interaction between threat and barrier on attitude or intention to exercise and eat a healthy diet was found, the main effect of barrier on the intentions to exercise approached significance, such that participants in the barrier addressed message condition had greater intentions to exercise than the participants in the barrier not addressed message conditions. Therefore, participants who read the narrative message that addressed the barrier of time to exercise had greater intentions to exercise than the participants who read the narrative message that did not address the barrier of time to exercise. One explanation for the main effect of barrier on the intention to exercise approaching significance but no interaction between threat and

barrier is that the two variables may be working independently rather than interacting with each other. Neither HBM nor EPPM studies have looked at the interaction between threat and barrier on the attitude and intention to exercise or eat a healthy diet before. Therefore, no conclusion can be drawn based on a single study, but the current study shows that the interaction between threat and barrier on attitude and behavioral intention to perform a recommended health action cannot be dismissed.

Three-way Interaction of Threat, Efficacy, and Barrier

Hypothesis 9(a-b) predicted that there would be a three-way interaction of threat, efficacy, and barrier such that participants exposed to high threat, high efficacy and barrier addressed message condition would have the most positive attitudes and greatest intentions to exercise and eating healthy diet than other message conditions. However, no significant three-way interaction of threat, barrier and efficacy was found on attitudes and intentions for either exercise or healthy eating behavior. The means did not show a definitive pattern of the interaction of the three variables in influencing the efficacy and behavior.

Although no three-way interaction was found, the analysis found a significant two-way interaction between efficacy and barrier on participants' attitudes towards exercise. Post-hoc tests found that the differences between participants in high efficacy and barrier not addressed condition and high efficacy and barrier addressed conditions was not significant. The difference between participants in low efficacy and barrier addressed and low efficacy and barrier not addressed message conditions was also not significant. The result showed that the participants in the high efficacy and barrier not addressed message condition had the greatest attitude towards exercise followed by

participants in low efficacy and barrier addressed, high efficacy and barrier addressed, and low efficacy and barrier not addressed message conditions. This is an interesting finding, which suggests that when efficacy is low then addressing the barrier may be more effective in influencing the individuals' attitudes towards recommended health behaviors than when efficacy is high. When participants are exposed to low efficacy message condition, addressing a barrier may help to increase their self-efficacy that can strengthen their attitudes towards the recommended behavior. But addressing the barrier may not be necessary when participants are exposed to a high efficacy message. However, more future studies are required to get a better understanding of how efficacy and barrier can impact the persuasiveness of a health promotion message. Also, future studies should examine the three-way interaction of threat, efficacy, and behavior in persuading individuals to follow the recommended health behaviors.

Influence of Message Content Manipulations on Transportation

Research Question 1 asked if the participants' transportation to the narrative world would vary among the manipulation of threat, efficacy, and barriers in the messages. Although no main or interaction effect was found for the diet behavior message, the main effects of efficacy and barrier on transportation for exercise behavior messages approached significance.

Participants in the high efficacy message condition reported greater transportation to the narrative world than participants in the low efficacy message conditions. Also, participants in the barrier not addressed message conditions reported higher transportation to the narrative world than the participants in the barrier addressed message conditions. Transportation to the narrative world has been defined as being

immersed into a story or carried away by a story (Larkey & Hecht, 2010). The current study suggests that individuals are more immersed into the narrative world in high efficacy message conditions than in low efficacy message conditions. Also individuals were immersed more into the narrative world when the narrative did not address the barrier to the exercise than when the narrative did address the barrier to the exercise. Therefore, based on the current study results, it can be suggested that when creating a narrative health message, a message with a high efficacy and a message that does not address barriers may be more immersive, causing the participants to pay more attention to the message. However, this finding should be taken with caution because the main effects of efficacy and barrier were only approaching significance for the exercise behavior messages, and no main effect of either efficacy or barrier was found for the healthy diet behavior message. There is a need for more fear appeal studies that use narrative as message stimuli to get a better understanding of the effect of threat, efficacy, and barrier on the participants' transportation to the narrative world.

Influence of Message Content Manipulations on Identification

Research Question 2 asked if the participants' identification with the character of the narrative vary among the manipulation of threat, efficacy, and barrier in the message. The result found a significant main effect of efficacy on identification for both the exercise and healthy diet behaviors. The result showed that the participants reported greater identification with the narrative character in the high efficacy message conditions than the low efficacy message conditions. Identification in the narrative is defined as emotional and cognitive process where viewers imagine themselves as a particular character (Moyer-Guse & Nabi, 2010). The current study showed that the

individuals imagined themselves as the character of the narrative more when the character had high confidence about being able to exercise or eat a healthy diet and also communicated that those behaviors are effective for improving heart health. The result also showed that although the participants may not always have positive attitude about exercising or eating a healthy diet, or intend to exercise or eat healthy diet, they still identify themselves as someone who is confident about being able to do so and think that exercising or eating a healthy diet can be helpful in improving heart health. Therefore, a high efficacy message can be more beneficial than a low efficacy message if one intends to influence the attitude and intention of individuals through a narrative (Prati et al., 2012). This result also calls for more fear appeal research in the future that use narratives as message stimuli to influence people's attitudes and behaviors regarding a health.

In summary, the current study showed some support for adding the variable, barrier, from HBM to EPPM. Although most of the hypotheses based on EPPM were not supported, the study found that addressing a barrier can increase the perceived self-efficacy of persons regarding a health behavior. That means, if people are exposed to a message that successfully addresses a barrier to performing a health behavior then it can increase their confidence in following the recommended health behavior. No significant interaction between threat and barrier was found on attitude or intention to exercise or eating a healthy diet. The study, however, found that main effect of barrier on intention to exercise approached significance. That means addressing the barrier of a recommended health behavior may help to increase the intention of individuals to perform that behavior. Although not hypothesized, an interaction between barrier and

efficacy on participants' attitudes towards exercise was found. The result suggests that when efficacy is high there is no need to address the barrier. However, when efficacy is low, addressing the barrier may be effective in influencing the attitudes of individuals towards a recommended health action.

The current study used narratives as message stimuli. One of the interesting findings was that efficacy significantly affected the readers' identification with the narrative character. For both the exercise and healthy diet behaviors, participants identified themselves more with the narrators when the narrators seemed confident about their ability to exercise or eat healthy diet and reassured the readers that these behaviors are effective for improving their heart health.

Thus, the current study indicates that incorporating addressed barriers into EPPM can help better persuade individuals to follow healthy behaviors. Also using narratives can cause people to identify more with the narrative character, which further increases the persuasiveness of the message (Prati et al., 2012).

Practical Implications

The current study added the variable of barrier from the Health Belief Model (HBM) to Extended Parallel Process Model (EPPM) with an aim to increase individuals' perceived self-efficacy to follow the recommended health behaviors. This study found some support for the effect of addressing a barrier in increasing perceived self-efficacy, attitude, and intention to performing the recommended health behavior.

The study also found a significant interaction between efficacy and barrier on attitude towards exercise, such that when the efficacy of a message is high it is better not to address the perceived barrier to performing a recommended health behavior.

However, when efficacy is low in the message, addressing the perceived barrier may be helpful in increasing people's positive attitudes towards a health behavior. The current study addressed the issue of heart disease, which is the number 1 cause of death for both men and women in the USA. Exercising and healthy diet behaviors were encouraged in the present study messages to prevent one from getting a cardiovascular disease and improving the heart health.

Based on the findings of the present study, one suggestion for the health campaign messages will be to address at least one barrier to performing the recommended health behaviors. If a health campaign is using a fear appeal message, then the message should also address potential barriers of the recommended health actions to help increase the individuals' perceived self-efficacy and direct them to go through the danger control process rather than the fear control process. The findings of this study may be applicable to other preventive health behaviors such as condom use to prevent HIV/AIDS and other sexually transmitted diseases. A research by Sarkar (2008) found that there were several barriers to condom use in both developing and developed countries. Some of the barriers included stigma attached to condom use, lack of a dialogue among partners regarding condom use, gender inequality, and ethnic and religious factors. The researcher suggested that such barriers may be addressed through education among the groups at risk (Sarkar, 2008). Such barriers may also be addressed in fear appeal messages by encouraging people to talk to their partners about condom use to prevent the transportation of HIV/AIDS and STDs. Barriers should be addressed regarding detection health behaviors such as breast cancer screening as well. A study by Young and Severson (2005) found that among older African-American women, failure

to be screened for breast cancer was related to knowledge and information barriers. The researchers suggested that older women should be educated more about the risks of breast cancer and importance of early detection (Young & Severson, 2005). Therefore, fear appeal message about breast cancer targeted to older African-American should include information about breast cancer and screening to increase their perceived self-efficacy.

Witte & Allen (2000) in their meta-analysis of fear appeal research suggested that practitioners should identify the barriers that may hinder one's self-confidence about performing the recommended action, such as lack of skill, costs, and emotions and should address them directly in the health message. For example, tobacco use such as smoking is one of the leading causes of preventable disease in the United States ("Smoking and Tobacco Use," 2018). Some of the diseases caused by smoking include cancer, heart disease, stroke, lung disease, and diabetes ("Smoking and Tobacco Use," 2018). Multiple barriers to smoking cessation have been reported, such as enjoyment of smoking, addiction to nicotine, habit, social acceptability of smoking, boredom, and smoking cultural norm (Moffatt, Whip, & Moffatt, 2004; Roddy, Antoniak, & Britton, 2006; Rosenthal, Carroll-Scott, Earnshaw, Sackey, O'Malley, Santilli, & Ickovics, 2013; Twyman, Bonevski, Paul, & Bryant; 2014). Therefore, for a health campaign to be successful, such barriers to cessation should be addressed (Twyman et al., 2014). Multiple studies have used the EPPM as a fear appeal message framework to persuade individuals to quit smoking with mixed results (Gharlipour et al., 2015; Thraser et al., 2016; Wong & Capella, 2009). Addressing perceived barriers regarding preventive health behaviors, such as smoking cessation may help increase the persuasiveness of the

fear appeal messages. To address a barrier of addiction to nicotine for smoking cessation, health messages can include the information about the availability of nicotine patches that can aid in successful smoking cessation (Russell et al., 1993). When individuals realize that they are capable of moving past perceived barriers, then it may boost their self-efficacy, leading to the attitude and behavioral change.

This study addressed the barrier of time for physical activity and healthy diet behaviors. Addressing one barrier had some positive impact on the self-efficacy of individuals. It will be insightful to find out if addressing more than one barrier in a health message can be more effective. There are numerous other perceived barriers that discourage individuals from following health recommendations such as social barriers that include lack of support from family and peers (Gomez-Lopez, Gallegos, & Extremera, 2010; O'Dea, 2003); and psychological barriers that include lack of motivation, lack of knowledge, laziness, lack of willpower, and not wanting to change (Mathews et al., 2010; Pratt et al., 2003). There are also linguistic, cultural, political, and socio-economic barriers that may hinder individuals from following a recommended health action such as vaccination against disease (Robinson & Gilmartin, 2002). Another suggestion from this study for the future health campaigns is to recognize the perceived barriers to following recommended health behaviors and addressing them in any health promotion messages that are designed and distributed. If a campaign is using fear appeal to persuade individuals, then it is necessary to address the barriers that may impact the decisions of individuals to either further process or ignore the health message.

This study did find partial support for the hypothesis that addressing barriers leads to an increase in perceived self-efficacy of individuals. Although no significant interaction between threat and barrier on perceived self-efficacy was found as predicted, the future studies should explore this relationship in other health behavior messages. Future studies should address multiple barriers and assess how those influence the main effect as well as interaction between threat and efficacy.

This study did not find support for the predicted interaction between threat and efficacy on danger control responses. The significant interaction between threat and efficacy for diet behavior was not in the predicted direction. Those exposed to low threat and high efficacy message conditions had the most positive attitudes towards eating a healthy diet. Based on the present finding, a suggestion for health message designers is to include efficacy information in both high threat and low threat messages. This may be beneficial, especially, when the message is targeted towards people who have a lower level of confidence about their ability to follow the recommended health behaviors. This study looked at the exercise and health behavior messages, but the findings can be used as a foundation for crafting and testing the health messages in other health areas such as vaccinations and prevention against of HIV/AIDS.

The current study used narratives as the message stimuli, and found no support for the fear control process. This implies that using narratives may be helpful in steering the individuals away from the fear control process, which leads to ignoring the message completely or perceiving that the message is manipulative and untrustworthy.

Researchers have argued that narratives are effective because individuals get transported to the narrative world and identify themselves with the character of the

narrative (Busselle & Bilandzic, 2008; Green 2006; Green & Brock, 2000; Wit, Das, & Vet, 2008). However, research has also found that narratives work better than non-narratives only when narrative contain mixed emotional context, such as both pleasant and unpleasant content (Leshner, Bolls, Gardner, Moore, & Kreuter, 2018). This research only used narrative messages and no comparison to non-narrative messages were done. Therefore, future EPPM studies should compare between narrative and non-narrative messages to understand how they affect the fear control process.

Limitations and Future Research

The first limitation of this experiment is that the study was conducted online and was not a controlled experiment in a lab. One major drawback of this type of experiment is uncertainty about the precise identity of the experimental participants (Horton, Rand, & Zeckhauser, 2011). Although a researcher may be cautious by asking the participants to answer several questions before they can take part in the study, one cannot be sure that the participants are answering questions about their identity honestly. Another disadvantage is the lack of environmental control by the researcher. If the experiment is conducted in a controlled lab, then the researcher can make sure that there are no other distractions and the participants are not multitasking. However, these factors cannot be controlled in an online experiment. Future studies can compare the online experiment results with the results from a controlled lab experiment to get a better understanding of how environment may influence the study results.

Second, the message stimuli used in this study were narratives. However, the narratives were presented to the participants as stand-alone content. There was a lack of context to whether the message was a Public Service Announcement (PSA) or an

advertisement. Most of the health communication studies use the message stimuli in a context of a PSA (Fishbein, Hall-Jamieson, Zimmer, Haeften, & Nabi, 2002; Dillard & Peck, 2000; Phua, 2016). However, this study did not provide any context for the narratives. Providing information about where the narratives came from could have made it easier for the participants to put the messages into context.

Third, this study only used self-report measures to understand the effect of message on individuals. Including thought-listing tasks in addition to self-report measures may have allowed the comparison of self-reported data with the list. Future studies should include both the self-report and thought listing-task to get a deeper understanding of how individuals process fear appeal messages.

Fourth, this research addressed only the barrier of time for both the exercise and healthy diet behaviors. Addressing more barriers, such as cost and taste, may have been more effective in increasing the perceived self-efficacy of the participants and made the message more persuasive. Future studies should identify and address more barriers to a health recommendation to understand if such approach increases the persuasiveness of fear appeal messages.

Fifth, the cronbach's alpha for perceived severity and defensive avoidance were less than 0.7 for both the exercise and healthy diet behaviors. This may have been a reason that the study did not find significant effect of severity on perceived severity. The study also failed to find support for the hypothesis that high threat and low efficacy message leads to fear control process such as defensive avoidance. Having cronbach's alpha of less than 0.7 suggests that the items in the scale may not be internally consistent in measuring the variables.

Conclusion

In conclusion, this research extended the EPPM by adding the variable of barrier from the Health Belief Model. The purpose of adding the variable was to increase the perceived self-efficacy of individuals regarding a recommended health behavior and persuade them to change their attitudes and intentions. The findings indicated that addressing the barrier may increase individuals perceived self-efficacy to perform a recommended action. This is an important finding of the study because scholars have asked for the fear appeal studies to identify and address barriers to increase self-efficacy (Hosseini, 2017; Kasser & Kosma, 2012; Witte & Allen, 2000). This study confirms the assumption of the previous studies that addressing barrier can be one way of increasing individuals' confidence about their ability to follow the recommended actions in a health message. This finding adds a meaningful variable to EPPM that needs to be studied further in the future studies to gain a better understanding of how addressing barrier may influence individuals' self-efficacy regarding other health behaviors.

This study did not find a significant interaction between threat and efficacy on attitude or intention to exercise. It did, however, find significant interaction between threat and efficacy on attitude towards eating a healthy diet, but the effect was not in the predicted direction. Although not significant, the participants in low threat and high efficacy message conditions had most positive attitudes towards healthy diet behavior. However, EPPM suggests that high threat and high efficacy messages should lead to more positive attitudes and greater intentions to follow a recommended health action than high threat and low efficacy messages. Although not in the predicted direction, the result of the current study is interesting because it suggests that although people may

not feel threatened by heart disease, they still process the message. In this case, efficacy may be the driving force for persuasion than threat because the study also found that if the efficacy of the message is high then it leads to more positive attitudes towards eating a healthy diet than if the efficacy is low. Therefore, although when individuals do not feel threatened by heart disease, they still know that it is important to eat healthy and exercise to stay healthy. But they may lack the confidence to start exercising or eating healthy. Being exposed to a high efficacy message may help to increase people's perceived self-efficacy and perceived response efficacy that can then lead to change in attitudes.

In their meta-analysis, Witte and Allen (2000), suggest that fear appeal studies should not focus solely on the danger control process, but should also assess the fear control responses such as denial, defensive avoidance, and reactance. This study assessed the fear control responses, but the findings indicated that participants did not tend to deny or avoid the message as something that was manipulative. Previous studies have suggested that using a narrative as a message stimulus may cause the individuals to counter-argue less because they are transported into the narrative world and identify with the narrator (DeWit, Das, & Vet, 2008; Green & Brock; 2002). The current study adds to the literature of EPPM by assessing both the fear and danger control processes.

The current study also found that the participants identified significantly more with the narrator in the high efficacy message conditions. When individuals identify with the characters of the narrative more, they are more likely to be persuaded (Graaf, Hoeken, Sanders, & Beentjes, 2012; Igartua, 2010). A study by Prati et al. (2012) found that narratives increased the participants' perceived self-efficacy related to influenza

vaccination in comparison to non-narrative messages. However, narratives and non-narratives did not differ in influencing the intention to received the influenza vaccination. Current study only used narratives messages. Therefore, future studies should use both the narrative and non-narrative messages to understand which messages are better at persuading individuals to follow the recommended health behaviors.

The findings from the current research uniquely contribute to the literature of fear appeal theories through the addition of the barrier variable to EPPM. The current study should be used as a beginning of the extension of EPPM. Future studies should further test how barrier may fit EPPM when applied to other preventive and detection health behaviors. This will allow health practitioners to design health messages unique to different health behaviors.

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Appendix A: Narrative Messages

Exercise

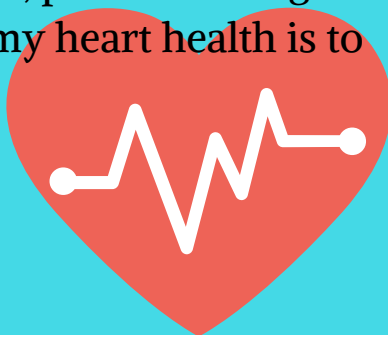
High Threat-High Efficacy-Barrier addressed

Riley's Story

I am Riley. My doctor told me that if I kept being sedentary, there will be severe health risks including high blood pressure, heart attack, and other heart related problems that can even cause death. Heart disease is the number 1 cause of death for both men and women in the USA. I believe that I am at risk of heart disease because of my sedentary lifestyle. My doctor has suggested that I exercise at least 30 minutes daily for five days a week. When I just started exercising, I tried moderate form of physical exercise like brisk walking. I am confident that I can walk regularly because it is free, easy, social, and is great exercise. I have learned that the simplest, positive change that I can make to effectively improve my heart health is to start walking . When I feel like I will not have enough time to exercise, I break up my exercise into smaller chunks of time during the day. It's all about what works best for me, as long as I am doing physical activity at a moderate or vigorous effort for at least 10 minutes at a time. These can include jogging, gardening, bicycling, playing tennis, walking the dog, or dancing.

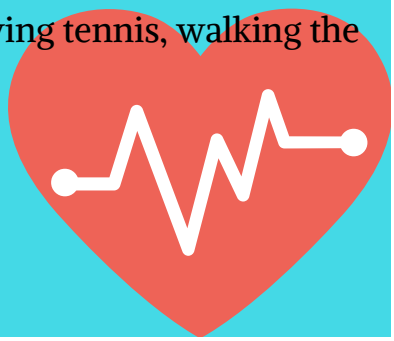
Riley's Story

I am Riley. My doctor told me that if I kept being sedentary, there will be severe health risks including high blood pressure, heart attack, and other heart related problems that can even cause death. Heart disease is the number 1 cause of death for both men and women in the USA. I believe that I am at risk of heart disease because of my sedentary lifestyle. My doctor has suggested that I exercise at least 30 minutes daily for five days a week. When I just started exercising, I tried moderate form of physical exercise like brisk walking. I am confident that I can walk regularly because it is free, easy, social, and is great exercise. I have learned that the simplest, positive change that I can make to effectively improve my heart health is to start walking.



Riley's Story

I am Riley. My doctor told me that if I kept being sedentary, there will be severe health risks including high blood pressure, heart attack, and other heart related problems that can even cause death. Heart disease is the number 1 cause of death for both men and women in the USA. I believe that I am at risk of heart disease because of my sedentary lifestyle. My doctor has suggested that I exercise at least 30 minutes daily for five days a week. Exercising in any form such as brisk walking for five days a week is a hard routine to continue and I am not confident that I can walk regularly. I also do not believe that walking regularly is effective at improving my heart health. When I feel like I will not have enough time to exercise, I break up my exercise into smaller chunks of time during the day. It's all about what works best for me, as long as I am doing physical activity at a moderate or vigorous effort for at least 10 minutes at a time. These can include jogging, gardening, bicycling, playing tennis, walking the dog, or dancing.

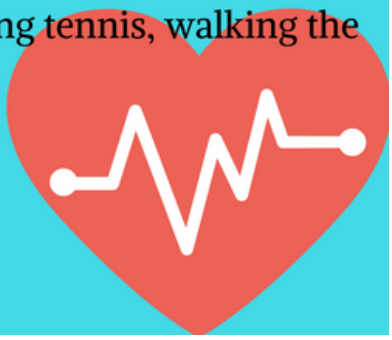


Riley's Story

I am Riley. My doctor told me that if I kept being sedentary, there will be severe health risks including high blood pressure, heart attack, and other heart related problems that can even cause death. Heart disease is the number 1 cause of death for both men and women in the USA. I believe that I am at risk of heart disease because of my sedentary lifestyle. My doctor has suggested that I exercise at least 30 minutes daily for five days a week. Exercising in any form such as brisk walking for five days a week is a hard routine to continue and I am not confident that I can walk regularly. I also do not believe that walking regularly is effective at improving my heart health.

Riley's Story

I am Riley. My doctor told me that if I kept being sedentary, there will be some health risks including low energy, high stress, bad mood, and heart disease. However, I do not believe that I am at risk of heart disease. My doctor has suggested that I exercise at least 30 minutes daily for five days a week. Exercising in any form such as brisk walking for five days a week is a hard routine to continue and I am not confident that I can walk regularly. I also do not believe that walking regularly is effective at improving my heart health. When I feel like I will not have enough time to exercise, I break up my exercise into smaller chunks of time during the day. It's all about what works best for me, as long as I am doing physical activity at a moderate or vigorous effort for at least 10 minutes at a time. These can include jogging, gardening, bicycling, playing tennis, walking the dog, or dancing.



Low Threat-low Efficacy-Barrier not Addressed

Riley's Story

I am Riley. My doctor told me that if I kept being sedentary, there will be some health risks including low energy, high stress, bad mood, and heart disease. However, I do not believe that I am at risk of heart disease. My doctor has suggested that I exercise at least 30 minutes daily for five days a week. Exercising in any form such as brisk walking for five days a week is a hard routine to continue and I am not confident that I can walk regularly. I also do not believe that walking regularly is effective at improving my heart health.

Riley's Story

I am Riley. My doctor told me that if I kept being sedentary, there will be some health risks including low energy, high stress, bad mood, and heart disease. However, I do not believe that I am at risk of heart disease. My doctor has suggested that I exercise at least 30 minutes daily for five days a week. When I just started exercising, I tried moderate form of physical exercise like brisk walking. I am confident that I can walk regularly because it is free, easy, social, and is great exercise. I have learned that the simplest, positive change that I can make to effectively improve my heart health is to start walking. When I feel like I will not have enough time to exercise, I break up my exercise into smaller chunks of time during the day. It's all about what works best for me, as long as I am doing physical activity at a moderate or vigorous effort for at least 10 minutes at a time. These can include jogging, gardening, bicycling, playing tennis, walking the dog, or dancing.

Riley's Story

I am Riley. My doctor told me that if I kept being sedentary, there will be some health risks including low energy, high stress, bad mood, and heart disease. However, I do not believe that I am at risk of heart disease. My doctor has suggested that I exercise at least 30 minutes daily for five days a week. When I just started exercising, I tried moderate form of physical exercise like brisk walking. I am confident that I can walk regularly because it is free, easy, social, and is great exercise. I have learned that the simplest, positive change that I can make to effectively improve my heart health is to start walking.

Healthy Diet

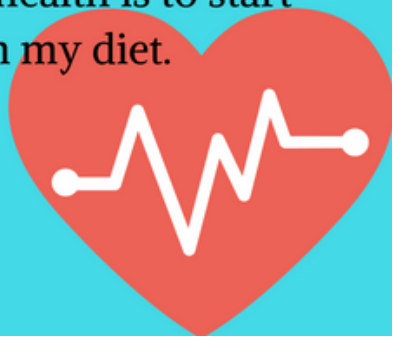
High Threat-High Efficacy-Barrier Addressed

Pat's Story

I am Pat. My doctor told me that if I kept eating an unhealthy diet, there will be severe health risks including high blood pressure, heart attack, and other heart related problems that can even cause death. Heart disease is the number 1 cause of death for both men and women in the USA. I believe that I may be at risk of heart disease because of my unhealthy diet. My doctor has suggested that I eat four to five servings of fruits and vegetables each per day. I am confident that I can eat healthy because I have options to eat fresh, frozen, canned, and dried vegetables and fruits. I have learned that the simplest, positive change that I can make to effectively improve my heart health is to start including more fruits and vegetables in my diet. When my schedule for weekdays seems to be crazy, I cook over the weekend and store pre-portioned vegetables and fruits in the fridge or freezer so that I have them handy and on-the-go.

Pat's Story

I am Pat. My doctor told me that if I kept eating an unhealthy diet, there will be severe health risks including high blood pressure, heart attack, and other heart related problems that can even cause death. Heart disease is the number 1 cause of death for both men and women in the USA. I believe that I am at risk of heart disease because of my unhealthy diet. My doctor has suggested that I eat four to five servings of fruits and vegetables each per day. I am confident that I can eat healthy because I have options to eat fresh, frozen, canned, and dried vegetables and fruits. I have learned that the simplest, positive change that I can make to effectively improve my heart health is to start including more fruits and vegetables in my diet.

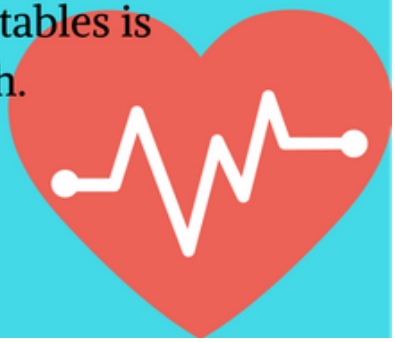


Pat's Story

I am Pat. My doctor told me that if I kept eating an unhealthy diet, there will be severe health risks including high blood pressure, heart attack, and other heart related problems that can even cause death. Heart disease is the number 1 cause of death for both men and women in the USA. I believe that I am at risk of heart disease because of my unhealthy diet. My doctor has suggested that I eat four to five servings of fruits and vegetables each per day. I am not confident that I can eat healthy because it is hard to include four to five servings of fruits and vegetables each per day in my diet. I also do not believe that eating fruits and vegetables is effective at improving my heart health. When my schedule for weekdays seems to be crazy, I cook over the weekend and store pre-portioned vegetables and fruits in the fridge or freezer so that I have them handy and on-the-go.

Pat's Story

I am Pat. My doctor told me that if I kept eating an unhealthy diet, there will be severe health risks including high blood pressure, heart attack, and other heart related problems that can even cause death. Heart disease is the number 1 cause of death for both men and women in the USA. I believe that I am at risk of heart disease because of my unhealthy diet. My doctor has suggested that I eat four to five servings of fruits and vegetables each per day. I am not confident that I can eat healthy because it is hard to include four to five servings of fruits and vegetables each per day in my diet. I also do not believe that eating fruits and vegetables is effective at improving my heart health.



Pat's Story

I am Pat. My doctor told me that if I kept eating an unhealthy diet, there will be some health risks including low energy, high stress, bad mood, and heart disease. However, I do not believe that I am at risk of heart disease. My doctor has suggested that I eat four to five servings of fruits and vegetables each per day. I am confident that I can eat healthy because I have options to eat fresh, frozen, canned, and dried vegetables and fruits. I have learned that the simplest, positive change that I can make to effectively improve my heart health is to start including more fruits and vegetables in my diet. When my schedule for weekdays seems to be crazy, I cook over the weekend and store pre-portioned vegetables and fruits in the fridge or freezer so that I have them handy and on-the-go.

Pat's Story

I am Pat. My doctor told me that if I kept eating an unhealthy diet, there will be some health risks including low energy, high stress, bad mood, and heart disease. However, I do not believe that I am at risk of heart disease. My doctor has suggested that I eat four to five servings of fruits and vegetables each per day. I am confident that I can eat healthy because I have options to eat fresh, frozen, canned, and dried vegetables and fruits. I have learned that the simplest, positive change that I can make to effectively improve my heart health is to start including more fruits and vegetables in my diet.

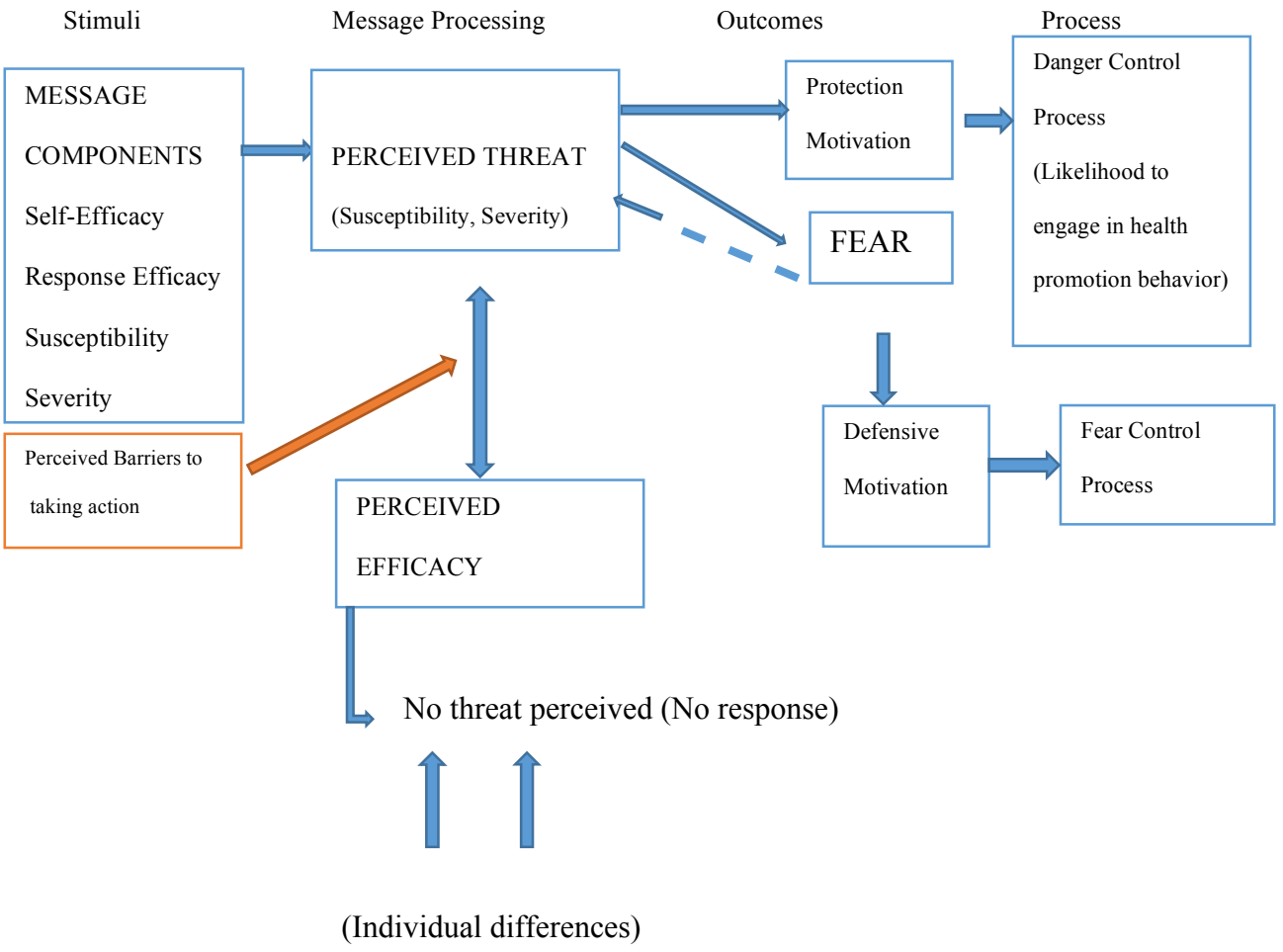
Pat's Story

I am Pat. My doctor told me that if I kept eating an unhealthy diet, there will be some health risks including low energy, high stress, bad mood, and heart disease. However, I do not believe that I am at risk of heart disease. My doctor has suggested that I eat four to five servings of fruits and vegetables each per day. I am not confident that I can eat healthy because it is hard to include four to five servings of fruits and vegetables each per day in my diet. I also do not believe that eating fruits and vegetables is effective at improving my heart health. When my schedule for weekdays seems to be crazy, I cook over the weekend and store pre-portioned vegetables and fruits in the fridge or freezer so that I have them handy and on-the-go.

Pat's Story

I am Pat. My doctor told me that if I kept eating an unhealthy diet, there will be some health risks including low energy, high stress, bad mood, and heart disease. However, I do not believe that I am at risk of heart disease. My doctor has suggested that I eat four to five servings of fruits and vegetables each per day. I am not confident that I can eat healthy because it is hard to include four to five servings of fruits and vegetables each per day in my diet. I also do not believe that eating fruits and vegetables is effective at improving my heart health.

Appendix B: Integrated Model



Appendix C: Pre-test Questionnaire

1.	To what extent did the message content describe heart disease as severe?						
	1- Not at all	2	3	4	5	6	7-Very much
2.	To what extent did the message content indicate that one is susceptible to heart disease?						
	1- Not at all	2	3	4	5	6	7- Very much
4.	To what extent did the message contain a health threat?						
	1- Not at all	2	3	4	5	6	7- Very much
5.	To what extent did the message indicate that one can confidently walk regularly (eat fruits and vegetables regularly)?						
	1- Not at all	2	3	4	5	6	7- Very much
6.	To what extent did the message content indicate that walking regularly (eating fruits and vegetables regularly) can effectively improve heart health?						
	1- Not at all	2	3	4	5	6	7- Very much
7.	To what extent did the message content indicate that one can manage time to exercise regularly (cook and eat healthy food regularly despite a busy schedule)?						
	1- Not at all	2	3	4	5	6	7- Very much

Appendix D: Main Study Questionnaire

In this section, we would like to ask you some questions about your exercise and eating activity.

Exercise is defined as physical activity that is planned, structured, and repetitive for the purpose of conditioning any part of the body or increasing physical fitness.

1. How much are you involved in following activities in a typical week?

Jogging						
1-Not at all	2	3	4	5	6	7-Very much
Fast walking						
1-Not at all	2	3	4	5	6	7-Very much
Swimming						
1-Not at all	2	3	4	5	6	7-Very much
Bicycling						
1-Not at all	2	3	4	5	6	7-Very much
Aerobic exercise						
1-Not at all	2	3	4	5	6	7-Very much
Other exercise						
1-Not at all	2	3	4	5	6	7-Very much

A serving of fruits includes one medium fruit (about the size of your fist), ½ cup of fresh; frozen or canned fruit; ¼ cup of dried fruits; or ¼ cup of juice. A serving of vegetables includes one cup of raw leafy vegetable; 1/2 cup of fresh; frozen or canned vegetables; or ½ cup of vegetable juice.

2.How much fruits do you eat on a typical day?						
1-Not at all	2	3	4	5	6	7-Very much
How much vegetables do you eat on a typical day?						
1-Not at all	2	3	4	5	6	7-Very much

Now please read the following narrative about exercise and heart disease (eating healthy diet). When you've finished reading the narrative, click the next button below it and you'll be presented with some questions about he message.

(Stimuli)

Please provide your response of each of the following items below that best represents your opinions about the exercise and heart disease AFTER reading the narrative.

3.	I am afraid of heart disease. (Perceived fear)						
	2- Strongly Disagree	2	3	4	5	6	7-Strongly Agree
4.	I am frightened by heart disease.						
	2- Strongly Disagree	2	3	4	5	6	7- Strongly Agree
5.	I am scared of heart disease						
	1- Strongly Disagree	2	3	4	5	6	7- Strongly Agree
6.	If I develop heart disease, it would be a serious condition. (I already have heart disease and if my condition was to get worse, it would be a serious condition.) (Perceived severity)						

	1-Strongly Disagree	2	3	4	5	6	7- Strongly Agree
7.	Heart disease is a severe medical condition.						
	1-Strongly Disagree	2	3	4	5	6	7- Strongly Agree
8.	A heart condition does NOT necessarily have to interfere with a person's capacity to live a normal life. (reversed)						
	1-Strongly Disagree	2	3	4	5	6	7- Strongly Agree
9.	It is likely that someday in the future I will be ill with heart disease. (Perceived Susceptibility)						
	1-Strongly Disagree	2	3	4	5	6	7- Strongly Agree
10.	My present lifestyle puts me at risk of developing heart disease. (I already have heart disease, am my lifestyle puts me at risk of aggravating my present condition.)						
	1- Strongly Disagree	2	3	4	5	6	7- Strongly Agree
11.	In comparison to other people, I am more susceptible to developing a serious heart condition.						
	1- Strongly Disagree	2	3	4	5	6	7- Strongly Agree
12.	Exercising for 30 minutes per day 5 days per week during the next month will be easy for me (Eating four to five servings of fruits and vegetables each per day during the next month will be easy for me). (Self-efficacy)						
	1-Strongly Disagree	2	3	4	5	6	7-Strongly Agree

13.	Exercising for 30 minutes per day 5 days per week during the next month will be difficult for me. (Eating four to five servings of fruits and vegetables each per day during the next month will be difficult for me). (reversed)						
	1-Strongly Disagree	2	3	4	5	6	7-Strongly Agree
14.	Exercising for 30 minutes per day 5 days per week during the next month will be inconvenient for me. (Eating four to five servings of fruits and vegetables each per day during the next month will be inconvenient for me). (reversed)						
	1-Strongly Disagree	2	3	4	5	6	7-Strongly Agree
15.	I am able to exercise for 30 minutes per day 5 days per week during the next month. (I am able to eat four to five servings of fruits and vegetables each per day during the next month).						
	1-Strongly Disagree	2	3	4	5	6	7-Strongly Agree
16.	I am certain I could exercise for 30 minutes per day 5 days per week during the next month. (I am certain I could Eat four to five servings of fruits and vegetables each per day during the next month).						
	1-Strongly Disagree	2	3	4	5	6	7-Strongly Agree

17.	If I wanted I could easily exercise for 30 minutes per day 5 days per week during the next month. (If I wanted I could easily Eat four to five servings of fruits and vegetables each per day during the next month).						
	1-Strongly Disagree	2	3	4	5	6	7-Strongly Agree
18.	Engaging in regular exercise works in preventing heart disease. (Eating healthy works in preventing heart disease). (Perceived response-efficacy)						
	1-Strongly Disagree	2	3	4	5	6	7-Strongly Agree
19.	Engaging in regular exercise is effective in preventing heart disease. (Eating healthy is effective in preventing heart disease).						
	1-Strongly Disagree	2	3	4	5	6	7-Strongly Agree
20.	Exercising regularly is costly in terms of time. (Eating healthy is costly in terms of time). (Perceived barrier)						
	1-Strongly Disagree	2	3	4	5	6	7-Strongly Agree
21.	It is hard to find the time to exercise regularly. (It is hard to find time to eat healthy regularly).						
	1-Strongly Disagree	2	3	4	5	6	7-Strongly Agree
22.	Having to exercise regularly interferes with my normal activities. (Having to eat healthy regularly interferes with my normal activities).						

	1-Strongly Disagree	2	3	4	5	6	7-Strongly Agree
23.	I intend to exercise for at least 30 minutes per day, 5 days a week during the next month. (Intention to exercise/eat healthy diet) (I intend to eat four to five servings of fruits and vegetables each per day during the next month).						
	1-Strongly Disagree	2	3	4	5	6	7-Strongly Agree
24.	I will exercise for at least 30 minutes per day, 5 days a week during the next month. (I will eat four to five servings of fruits and vegetables each per day during the next month).						
	1-Strongly Disagree	2	3	4	5	6	7-Strongly Agree
25.	Exercising for at least 30 minutes per day, 5 days a week during the next month would be: (Eating four to five servings of fruits and vegetables each per day during the next month would be:) (Attitude towards exercise/eating healthy)						
	1-Bad	2	3	4	5	6	7-Good
	1-Not Enjoyable						7-Enjoyable
	1-Unwise	2	3	4	5	6	7-Wise
	1-Not beneficial	2	3	4	5	6	7-Beneficial
26.	When I first heard about heart disease, my instinct was to:						
	1-Not want to think about heart disease	2	3	4	5	6	7-Want to think about heart disease

	1-Not want to do something to keep myself from getting heart disease						7-Want to do something to keep myself from getting the heart disease
28.	I thought that the story was: (Issue derogation)						
	1-Not at all overblown	2	3	4	5	6	7- Overblown
	1-Not at all exaggerated	2	3	4	5	6	7- Exaggerated
	1-Not at all overstated	2	3	4	5	6	7- Overstated
29.	I felt that the story was: (Perceived manipulation)						
	1-Not at all manipulative	2	3	4	5	6	7- Manipulative
	1-Not at all misleading	2	3	4	5	6	7-Misleading
	1-Not at all distorted	2	3	4	5	6	7-Distorted
26.	When I was reading the story, I could easily picture the events in it taking place.						
	1-Not at all	2	3	4	5	6	7-Very much
27.	When I was reading the story, activity going on in the room around me was on my mind. (Reversed)						

	1-Not at all	2	3	4	5	6	7-Very much
28.	I was mentally involved in the story while reading it.						
	1-Not at all	2	3	4	5	6	7-Very much
29.	After finishing the story, I found it easy to put it out of my mind (reversed).						
	1-Not at all	2	3	4	5	6	7-Very much
30.	The story affected me emotionally.						
	1-Not at all	2	3	4	5	6	7-Very much
31.	I found my mind wandering while reading the story (reversed).						
	1-Not at all	2	3	4	5	6	7-Very much
32.	The events in the story are relevant to my everyday life.						
	1-Not at all	2	3	4	5	6	7-Very much
33.	The events in the story changed my life.						
	1-Not at all	2	3	4	5	6	7-Very much
34.	How similar are you to Riley (Pat)?						
	1-Not at all	2	3	4	5	6	7- Very much
35.	How much do you like Riley (Pat)?						
	1-Not at all	2	3	4	5	6	7- Very much
36.	How much do you feel like you know Riley (Pat)?						
	1-Not at all	2	3	4	5	6	7-Very much
37.	How much do you want to be like Riley (Pat)?						
	1-Not at all	2	3	4	5	6	7-Vert much

You are almost done! Now, please answer the following questions about yourself.

26. What is your age? _____

27. What is your gender?

a. Male

b. Female

c. Other (Please Specify)

28. What best describes your race or ethnicity?

a. White or Caucasian

b. Black or African American

c. Hispanic

d. Asian

e. Native American

f. Pacific Islander

g. Other (Please Specify)

29. What is the highest level of education you have completed?

a. Less than High School

b. High School/GED

c. Some College

d. 2-year college degree

e. 4- year college degree

f. Master's degree

g. Doctoral degree

h. Professional degree (JD, MD)

30. What is your employment status?

a. Employed full time

b. Employed part-time

c. Not employed

d. Retired

31. What is your marital status?

a. Single (never been married)

b. Married

c. Widowed

d. Separated

e. Divorced

32. Have you ever been diagnosed with heart disease?

a. Yes

b. No

33. Do you have a close family member who has heart disease?

a. Yes

b. No

34. What is your household income before tax?

a. Under 10,000

b. 10,000-19,999

c. 20,000-29,999

d. 30,000-39,999

e. 40,000-49,999

f. 50,000-59,999

g. 60,000-69,999

h. 70,000-79,999

i. 80,000-89,999

j. 90,000-99,999

k. 100,000-149,999

l. More than 150,999

35. What is your zip code?

Appendix E: ANCOVA Summary Tables

Table 12. ANCOVA Summary Table for Perceived Fear (Exercise)

Source	*df*	*MS*	*F*	*p*	η^2_{part}	*Observed Power*
Exercise_Behavior	1	1.587	.601	.439	.001	.121
Threat	1	2.386	.903	.342	.002	.158
Efficacy	1	.251	.095	.758	.000	.061
Threat * Efficacy	1	.301	.114	.736	.000	.063
Error	440	2.641				
Total	445					
Corrected Total	444					

Note. $R^2 = .004$($R^2_{Adjusted} = -.005$).
$^*p < .05$

Table13. ANCOVA Summary Table for Perceived Severity (Exercise)

Source	*df*	*MS*	*F*	*p*	η^2_{part}	*Observed Power*
Exercise_Behavior	1	6.311	3.307	.070	.007	.442
Threat	1	.947	.496	.481	.001	.108
Error	442	1.908				
Total	445					
Corrected Total	444					

Note. $R^2 = .004$($R^2_{Adjusted} = -.005$).
$^*p < .05$

Table 14. ANCOVA Summary Table for Perceived Susceptibility (Exercise)

Source	*df*	*MS*	*F*	*p*	η^2_{part}	*Observed Power*
Exercise_Behavior	1	29.067	13.667	<.001*	.030	.958
Threat	1	1.653	.777	.378	.002	.142
Error	442	2.127				
Total	445					
Corrected Total	444					

Note. $R^2 = .032$($R^2_{Adjusted} = .028$).
$^*p < .05$

Table 15. ANCOVA Summary Table for Perceived Self-Efficacy (Exercise)

Source	*df*	*MS*	*F*	*p*	η^2_{part}	*Observed Power*
Exercise_Behavior	1	89.627	42.618	.<001*	.089	1.000
Efficacy	1	.581	.276	.599	.001	.082
Barrier	1	9.363	4.452	.035*	.010	.558
Threat	1	.912	.434	.511	.001	.101
Barrier * Threat	1	1.859	.884	.348	.002	.155
Error	436	2.103				
Total	445					
Corrected Total	444					

Note. $R^2 = .106$($R^2_{Adjusted} = .089$).
*$p < .05$

Table 16. ANCOVA Summary Table for Perceived Response Efficacy (Exercise)

Source	*df*	*MS*	*F*	*p*	η^2_{part}	*Observed Power*
Exercise_Behavior	1	8.518	5.306	.022*	.012	.632
Efficacy	1	.037	.023	.879	.000	.053
Error	442	1.605				
Total	445					
Corrected Total	444					

Note. $R^2 = .012$($R^2_{Adjusted} = .007$).
*$p < .05$

Table.17ANCOVA Summary Table for Perceived Barrier (Exercise)

Source	*df*	*MS*	*F*	*p*	η^2_{part}	*Observed Power*
Exercise_Behavior	1	12.824	5.202	.023*	.012	.624
Barrier	1	3.026	1.227	.269	.003	.198
Error	442	2.465				
Total	445					
Corrected Total	444					

Note. $R^2 = .012$($R^2_{Adjusted} = .011$).
*$p < .05$

Table.18 ANCOVA Summary Table for Defensive Avoidance(Exercise)

Source	*df*	*MS*	*F*	*p*	η^2_{part}	*Observed Power*
Exercise_Behavior	1	58.249	33.486	<.001*	.071	1.000
Threat	1	.643	.369	.544	.001	.093
Efficacy	1	.286	.164	.685	.000	.069
Threat * Efficacy	1	.023	.013	.909	.000	.051
Error	440	1.740				
Total	445					
Corrected Total	444					

Note. $R^2 = .071$($R^2_{Adjusted} = .063$).
*$p < .05$

Table 19. ANCOVA Summary Table for Issue Derogation(Exercise)

Source	*df*	*MS*	*F*	*p*	η^2_{part}	*Observed Power*
Exercise_Behavior	1	24.234	9.416	.002*	.021	.865
Threat	1	3.004	1.167	.281	.003	.190
Efficacy	1	5.723	2.224	.137	.005	.319
Threat * Efficacy	1	.858	.334	.564	.001	.089
Error	439	2.574				
Total	444					
Corrected Total	443					

Note. $R^2 = .030$($R^2_{Adjusted} = .021$).
*$p < .05$

Table 20. ANCOVA Summary Table for Perceived Manipulation(Exercise)

Source	*df*	*MS*	*F*	*p*	η^2_{part}	*Observed Power*
Exercise_Behavior	1	11.305	4.537	.034*	.010	.566
Threat	1	1.931	.775	.379	.002	.142
Efficacy	1	2.527	1.014	.314	.002	.171
Threat * Efficacy	1	2.925	1.174	.279	.003	.191
Error	440	2.492				
Total	445					
Corrected Total	444					

Note. $R^2 = .017$($R^2_{Adjusted} = .008$).
*$p < .05$

Table 21. ANCOVA Summary Table for Attitude towards Exercise

Source	*df*	*MS*	*F*	*p*	η^2_{part}	*Observed Power*
Exercise_Behavior	1	.143	.198	.657	.000	.073
Threat	1	.217	.299	.585	.001	.085
Barrier	1	.060	.082	.774	.000	.059
Efficacy	1	1.047	1.444	.230	.003	.224
Threat * Barrier	1	1.059	1.462	.227	.003	.226
Threat * Efficacy	1	.976	1.347	.246	.003	.212
Barrier * Efficacy	1	3.154	4.352	.038*	.010	.548
Threat * Barrier * Efficacy	1	.064	.089	.766	.000	.060
Error	435	.725				
Total	444					
Corrected Total	443					

Note. $R^2 = .019$($R^2_{Adjusted} = .001$).
*$p < .05$

Table 22. ANCOVA Summary Table for Intention to Exercise

Source	*df*	*MS*	*F*	*p*	η^2_{part}	*Observed Power*
Exercise_Behavior	1	158.423	61.397	<.001*	.123	1.000
Threat	1	.873	.338	.561	.001	.089
Barrier	1	7.756	3.006	.084	.007	.409
Efficacy	1	4.289	1.662	.198	.004	.251
Threat * Barrier	1	2.809	1.089	.297	.002	.180
Threat * Efficacy	1	.843	.327	.568	.001	.088
Barrier * Efficacy	1	4.371	1.694	.194	.004	.255
Threat * Barrier * Efficacy	1	.218	.084	.772	.000	.060
Error	436	2.580				
Total	445					
Corrected Total	444					

Note. $R^2 = .193$($R^2_{Adjusted} = .124$).
*$p < .05$

Table 23. ANCOVA Summary Table for Transportation to the Narrative (Exercise)

Source	*df*	*MS*	*F*	*p*	η^2_{part}	*Observed Power*
Exercise_Behavior	1	91.516	48.472	<.001*	.100	1.000
Threat	1	1.834	.972	.325	.002	.166
Barrier	1	5.366	2.842	.093	.006	.391
Efficacy	1	5.849	3.098	.079	.007	.419
Threat * Barrier	1	1.461	.774	.380	.002	.142
Threat* Efficacy	1	.066	.035	.852	.000	.054
Barrier * Efficacy	1	2.450	1.297	.255	.003	.206
Threat * Barrier * Efficacy	1	.268	.142	.706	.000	.066
Error	436	1.888				
Total	445					
Corrected Total	444					

Note. $R^2 = .118$($R^2_{Adjusted} = .102$).
*$p < .05$

Table 24. ANCOVA Summary Table for Identification with the Narrative (Diet)

Source	*df*	*MS*	*F*	*p*	η^2_{part}	*Observed Power*
Exercise_Behavior	1	13.837	8.326	.004*	.019	.821
Threat	1	.323	.195	.659	.000	.072
Barrier	1	.975	.586	.444	.001	.119
Efficacy	1	31.944	19.220	.000*	.042	.992
Threat * Barrier	1	2.300	1.384	.240	.003	.217
Threat * Efficacy	1	.286	.172	.678	.000	.070
Barrier* Efficacy	1	.630	.379	.539	.001	.094
Threat* Barrier * Efficacy	1	.166	.100	.752	.000	.061
Error	436	1.662				
Total	445					
Corrected Total	444					

Note. $R^2 = .066$($R^2_{Adjusted} = .048$).
*$p < .05$

Table25. ANCOVA Summary Table for Perceived Fear (Diet)

Source	*df*	*MS*	*F*	*p*	η^2_{part}	*Observed Power*
Diet_Behavior	1	.576	.199	.656	.000	.073
Threat	1	.966	.334	.564	.001	.089
Efficacy	1	2.634	.910	.341	.002	.159
Threat*Efficacy	1	.781	.270	.604	.001	.081
Error	440	2.894				
Total	445					
Corrected Total	444					

Note. R^2 = .004 ($R^2_{Adjusted}$ = -.005).
$^*p < .05$

Table 26. ANCOVA Summary Table for Perceived Severity (Diet)

Source	*df*	*MS*	*F*	*p*	η^2_{part}	*Observed Power*
Diet_Behavior	1	8.488	5.033	.025*	.011	.610
Threat	1	3.053	1.810	.179	.004	.269
Error	442	1.686				
Total	445					
Corrected Total	444					

Note. R^2 = .015 ($R^2_{Adjusted}$ = .011).
$^*p < .05$

Table27. ANCOVA Summary Table for Perceived Susceptibility (Diet)

Source	*df*	*MS*	*F*	*p*	η^2_{part}	*Observed Power*
Diet_Behavior	1	26.984	11.905	.001*	.026	.931
Threat	1	.672	.297	.586	.001	.084
Error	442	2.267				
Total	445					
Corrected Total	444					

Note. R^2 = .015 ($R^2_{Adjusted}$ = .011).
$^*p < .05$

Table 28. ANCOVA Summary Table for Perceived Self-Efficacy (Diet)

Source	*df*	*MS*	*F*	*p*	η^2_{part}	*Observed Power*
Diet_Behavior	1	110.533	63.456	<.001*	.127	1.000
Threat	1	1.256	.721	.396	.002	.135
Efficacy	1	6.445	4.076	.044*	.009	.522
Barrier	1	3.720	2.135	.145	.005	.308
Threat * Barrier	1	1.590	.913	.340	.002	.159
Error	436	1.742				
Total	445					
Corrected Total	444					

Note. R^2 = .015 ($R^2_{Adjusted}$ = .011).
*$p < .05$

Table 28. ANCOVA Summary Table for Perceived Response Efficacy (Diet)

Source	*df*	*MS*	*F*	*p*	η^2_{part}	*Observed Power*[b]
Diet_Behavior	1	1.895	1.069	.302	.002	.178
Efficacy	1	1.638	.924	.337	.002	.160
Error	442	1.774				
Total	445					
Corrected Total	444					

Note. R^2 = .004 ($R^2_{Adjusted}$ = .000).
*$p < .05$

Table 29. ANCOVA Summary Table for Perceived Barrier (Diet)

Source	*df*	*MS*	*F*	*p*	η^2_{part}	*Observed Power*
Diet_Behavior	1	30.152	11.832	.001*	.026	.930
Barrier	1	.030	.012	.914	.000	.051
Error	442	2.548				
Total	445					
Corrected Total	444					

Note. R^2 = .026 ($R^2_{Adjusted}$ = .022).
*$p < .05$

Table 30. ANCOVA Summary Table for Defensive Avoidance (Diet)

Source	*df*	*MS*	*F*	*p*	η^2_{part}	*Observed Power*
Diet_Behavior	1	35.499	18.386	<.001*	.040	.990
Threat	1	.709	.367	.545	.001	.093
Efficacy	1	.635	.329	.567	.001	.088
Threat * Efficacy	1	.350	.181	.671	.000	.071
Error	440	1.931				
Total	445					
Corrected Total	444					

Note. R^2 = .042 ($R^2_{Adjusted}$ = .033).
*$p < .05$

Table 31. ANCOVA Summary Table for Issue Derogation (Diet)

Source	*df*	*MS*	*F*	*p*	η^2_{part}	*Observed Power*
Diet_Behavior	1	4.336	1.488	.223	.003	.230
Threat	1	1.537	.527	.468	.001	.112
Efficacy	1	5.103	1.752	.186	.004	.262
Threat * Efficacy	1	2.118	.727	.394	.002	.136
Error	438	2.914				
Total	443					
Corrected Total	442					

Note. R^2 = .010 ($R^2_{Adjusted}$ = .001).
*$p < .05$

Table 32. ANCOVA Summary Table for Perceived Manipulation (Diet)

Source	*df*	*MS*	*F*	*p*	η^2_{part}	*Observed Power*
Diet_Behavior	1	2.808	1.097	.296	.002	.181
Threat	1	.266	.104	.747	.000	.062
Efficacy	1	4.507	1.760	.185	.004	.263
Threat* Efficacy	1	1.136	.444	.506	.001	.102
Error	439	2.560				
Total	444					
Corrected Total	443					

Note. R^2 = .007($R^2_{Adjusted}$ = -.002).
*$p < .05$

Table.33. ANCOVA Summary Table for Intention to Eat Healthy Diet

Source	*df*	*MS*	*F*	*p*	η^2_{part}	*Observed Power*
Diet_Behavior	1	172.105	90.375	<.001*	.172	1.000
Threat	1	1.016	.534	.465	.001	.113
Barrier	1	3.977	2.088	.149	.005	.303
Efficacy	1	3.866	2.030	.155	.005	.296
Threat * Barrier	1	.084	.044	.834	.000	.055
Threat * Efficacy	1	.010	.005	.941	.000	.051
Barrier * Efficacy	1	.091	.048	.827	.000	.055
Threat * Barrier * Efficacy	1	1.236	.649	.421	.001	.127
Error	436	1.904				
Total	445					
Corrected Total	444					

Note. $R^2 = .183 (R^2_{Adjusted} = .168)$.
*$p < .05$

Table 35. ANCOVA Summary Table for Attitude towards Eating Healthy Diet

Source	*df*	*MS*	*F*	*p*	η^2_{part}	*Observed Power*
Diet_Behavior	1	.105	2.198	.139	.005	.316
Threat	1	.022	.467	.495	.001	.105
Efficacy	1	.188	3.952	.047*	.009	.510
Barrier	1	.014	.297	.586	.001	.085
Threat * Efficacy	1	.319	6.700	.010*	.015	.733
Threat * Barrier	1	.013	.282	.596	.001	.083
Efficacy * Barrier	1	.108	2.263	.133	.005	.323
Threat * Efficacy * Barrier	1	.052	1.089	.297	.002	.181
Error	435	.048				
Total	444					
Corrected Total	443					

Note. $R^2 = .183 (R^2_{Adjusted} = .168)$.
*$p < .05$

Table 36. ANCOVA Summary Table for Transportation to the Narrative World (Diet)

Source	*df*	*MS*	*F*	*p*	η^2_{part}	*Observed Power*
Diet_Behavior	1	20.595	11.851	.001*	.026	.930
Threat	1	3.093	1.780	.183	.004	.265
Barrier	1	1.399	.805	.370	.002	.146
Efficacy	1	.604	.348	.556	.001	.090
Threat* Barrier	1	.061	.035	.851	.000	.054
Threat * Efficacy	1	3.680	2.117	.146	.005	.306
Barrier* Efficacy	1	.005	.003	.956	.000	.050
Threat* Barrier* Efficacy	1	.530	.305	.581	.001	.085
Error	436	1.738				
Total	445					
Corrected Total	444					

Note. $R^2 = .036$($R^2_{Adjusted} = .019$).
*$p < .05$

Table.37 ANCOVA Summary Table for Identification with the Narrative Character (Diet)

Source	*df*	*MS*	*F*	*p*	η^2_{part}	*Observed Power*
Diet_Behavior	1	5.628	3.028	.083	.007	.412
Threat	1	.024	.013	.909	.000	.051
Barrier	1	1.725	.928	.336	.002	.161
Efficacy	1	45.768	24.622	.000*	.053	.999
Threat * Barrier	1	4.211	2.265	.133	.005	.324
Threat* Efficacy	1	.667	.359	.549	.001	.092
Barrier * Efficacy	1	.351	.189	.664	.000	.072
Threat * Barrier* Efficacy	1	.057	.031	.861	.000	.053
Error	436	1.859				
Total	445					
Corrected Total	444					

Note. $R^2 = .069$($R^2_{Adjusted} = .052$).
*$p < .05$

Appendix F: IRB Outcome Letter

Institutional Review Board for the Protection of Human Subjects

Approval of Initial Submission – Exempt from IRB Review – AP01 May 30, 2018 **IRB#:** 9367

Approval Date: 05/30/2018

Principal Investigator: Rashmi Thapaliya

Exempt Category: 2

Study Title: An Extension of Extended Parallel Process Model (EPPM) to Promote Healthy Heart Behaviors

On behalf of the Institutional Review Board (IRB), I have reviewed the above-referenced research study and determined that it meets the criteria for exemption from IRB review. To view the documents approved for this submission, open this study from the *My Studies* option, go to *Submission History*, go to *Completed Submissions* tab and then click the *Details* icon.

As principal investigator of this research study, you are responsible to:

Conduct the research study in a manner consistent with the requirements of the IRB and federal regulations 45 CFR 46.

Request approval from the IRB prior to implementing any/all modifications as changes could affect the exempt status determination.

Maintain accurate and complete study records for evaluation by the HRPP Quality Improvement Program and, if applicable, inspection by regulatory agencies and/or the study sponsor.

Notify the IRB at the completion of the project. If you have questions about this notification or using iRIS, contact the IRB @ 405-325-8110 or irb@ou.edu.

Cordially,

Ioana Cionea, PhD Vice Chair, Institutional Review Board