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THE USE OF FEAR APPEALS IN GENETIC TESTING

by

Joseph Roy Grandpre

A Dissertation Submitted to the Faculty of the

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As members of the Final Examination Committee, we certify that we have read the dissertation prepared by Joseph Roy Grandpre

entitled The use of fear appeals in genetic testing

and recommend that it be accepted as fulfilling the dissertation requirement for the Degree of Doctor of Philosophy

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Final approval and acceptance of this dissertation is contingent upon the candidate's submission of the final copy of the dissertation to the Graduate College.

I hereby certify that I have read this dissertation prepared under my direction and recommend that it be accepted as fulfilling the dissertation requirement.

Dissertation Director David Buller — 11/12/99 Date

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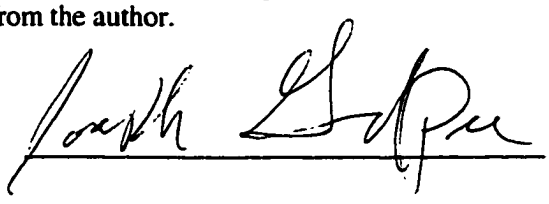
SIGNED: 

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This dissertation is also dedicated to the loving memory of my father, Bernard C. Grandpre, and to my mother, Betty Grandpre. Your love and guidance are the foundation upon which my life is built.

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ABSTRACT

The traditional model of medicine involves recognizing symptoms, undergoing diagnostic tests to find the cause of the symptoms, and provide treatment to relieve or cure the underlying disease. However, with the advent of genetic testing and the ability to diagnose asymptomatic individuals, the traditional model of diagnostic testing and treatment no longer applies. By employing the Extended Parallel Processing Model, EPPM, and utilizing messages similar to fear appeals, this study examined participants' perceptions of testing and treatment efficacy, behavioral intentions to undergo testing, and attitudes towards traditional and genetically-based diagnostic testing. Results indicated that the type of diagnostic test and the temporal proximity of the treatment with respect to the diagnostic test is important in determining the perceived efficacy of testing, treatment, and intent to undergo testing. Practical as well as theoretical implications are discussed as well as directions for future research.

CHAPTER I

RATIONALE AND HYPOTHESES

Introduction

Diagnostic tests and treatment are inexorably interdependent aspects of most medical procedures involving chronic diseases. The traditional biomedical model of disease begins with patients presenting with symptoms of a disease or physical problem they are experiencing. The physician, using the scientific method, attempts to diagnose the cause of the symptoms or problem via physical examination and other technological procedures. Once the physician has determined what disease or condition is probably causing the symptoms treatment usually begins as soon as possible. This treatment may include prescription drugs, advocating a lifestyle change (i.e., advising the patient stop smoking), or a combination of pharmacological remedies and behavior modification. It is hoped that by diagnosing and treating the disease at an early stage it will be more curable or that the treatment will at least prevent further progression of the disease. As Hepburn (1996) states, "The notion that early diagnosis and intervention is important therapeutically is almost an article of faith in medicine" (p.105).

For example, an individual experiencing angina may undergo a battery of tests (i.e., electrocardiograms, stress tests, radionuclide imaging, coronary arteiography, and angiography) to determine if the cause of the pain is in fact Coronary Artery Disease, CAD (Merck Manual, 1997). Upon diagnosis, the physician will start the patient on a specific course of preventative and therapeutic treatments. These treatments may consist

of pharmacotherapy with beta-blockers, nitrates, or antiplatelet drugs; behavior modification such as increasing exercise, quitting smoking, or changing to a low-fat diet; bypass surgery or angioplasty; or a combination of treatment alternatives (Merck Manual, 1997). The key in this model is that the treatment(s) follow the disease diagnosis as closely as possible and that the diagnoses closely follow the initial symptoms of the disease. This more traditional biomedical view of disease diagnosis (symptoms ⇒ testing ⇒ diagnosis ⇒ treatment) is what the public has come to expect from their health care providers. As Glenn (1988) states:

> Popular culture holds that every symptom has a cause, that every malady represents a disease, and that every illness has a cure. People also hold that physicians must do something – either give medicine for, perform a procedure on, or otherwise actively treat any announced symptom (p. 498).

Currently, physicians may be confronted with a problem that neither they nor the general public have encountered before. This problem involves having the ability, via genetic testing, to potentially diagnose a disease so early in its pathology that surveillance for symptoms may be the only available treatment for years. In such a case, patients are confronted by the rather unusual dilemma of whether or not to be tested for a disease for which they are not displaying any symptoms and for which there may be no immediate treatment if they test positive for the disease. This lack of immediate treatment sets the genetic testing model (testing ⇒ diagnosis ⇒ waiting/surveillance ⇒ symptoms ⇒ treatment) apart from the more traditional medical model (symptoms ⇒ testing ⇒ diagnosis ⇒ treatment) (Taylor & Kelner, 1996).

Because of the difference in treatment immediacy between traditional and genetic diagnostic testing, this study set out to examine the differences between the perceived effectiveness of treatments associated with these two diagnostic models. In addition, the present study examined whether a proven technique of social influence (fear appeals) operates in the same fashion when persuading someone to undergo genetic testing as opposed to traditional testing procedures. Using Witte's (1996, 1994, 1992) Extended Parallel Processing Model, EPPM, as a guide in constructing fear appeals, this study asked subjects to imagine themselves in a situation where they would have to decide whether or not to undergo a diagnostic test (either traditional or genetic) for a specific disease. It is assumed that because there is a greater lag time between diagnosis and treatment in genetic testing, fear appeals will not operate in the same fashion to persuade someone to undergo a genetic diagnostic test as fear appeals do when persuading someone to submit to more traditional diagnostic testing.

Within the last decade there has been an upsurge of genetic testing for all types of diseases including colon cancer, breast cancer, cardiovascular disease, diabetes, and Alzheimer's disease (Cho, Arruda, & Holtaman, 1997; Khoury, 1996; Raffel, 1997; Scheuner, Wang, Raffel, Larabell, & Rotter, 1997). Most of these tests simply provide individuals with a personal assessment of their risk of developing a particular disease. Few provide absolute assurance about a disease. An exception would be testing for a disease like Huntington's. When a person possesses a particular mutation on the specific chromosome for Huntington's disease, s/he has a 100% chance of developing the disease (Gelbart, 1998). Furthermore, for most genetic testing information on how to prevent or

treat most genetic diseases is sorely lacking (Kennedy, 1998; National Cancer Institute, 1998; Taylor & Kelner, 1996). "We're offering testing without commitment to follow-up and knowledge of what to do once the test comes back" (Kennedy, 1998, p. 33).

One reason that genetic testing has become so interrelated with certain types of cancer, particularly breast/ovarian and colon, stems from the two-hit hypothesis of carcinogenesis by Knudson (1996). This hypothesis states that at least two hits (mutations) in a gene are necessary in order for a cell to become cancerous. These mutations can come from the environment (i.e., exposure to radiation or particular chemicals) or can be inherited. A child born with an inherited mutation in a particular gene has one less hit to expend before developing cancer. This results in the child having a greater chance of developing certain types of cancer than someone born without the mutation. However, since physicians usually do not treat asymptomatic people, individuals who know they have an inherited mutation, which places them at greater risk for a disease, may have no way to prevent or treat the disease until they develop symptoms.

For example, by testing for specific mutations in the BRCA1 and BRCA2 genes, it is possible to inform a woman of any age that she has a very high probability (80-90%) of developing breast cancer by the time she turns 70. This is based solely on the fact that she inherited a particular gene mutation from her mother or father (Lerman & Croyle, 1994; Lerman, Daly, Masny, & Balshem, 1994; Lerman, Narod, Schluman, Hughes, Gomez-Caminero, Bonney, Gold, Trock, Main, Lynch, Fulmore, Snyder, Lemon, Conway, Tonin, Lenoir, & Lynch 1996; Lerman, Seay, Balshem, & Audrain, 1995;

Lerman, Trock, Rimer, Jepson, Brody, & Boyce, 1991). Though the BRCA1 (located on chromosome 17q) and BRCA2 (located on chromosome 13q) genes may be involved in only 5 -10% of all breast and ovarian cancers, it is estimated that 1 in every 200-400 women may be affected by these genes (Jacobsen, Valdimarsdottir, Brown, & Offit, 1997; Lerman, Daly, Masny, & Balshem, 1994). Unlike a woman who detects a lump in her breast and is quickly diagnosed and treated, women who test positive for this genetic defect may find that they have very few treatment alternatives.

To date there is no absolute way to prevent breast cancer, although trials using drugs like Tamoxifen hold some promise (Dove, 1998; Early Breast Cancer Trialists' Collaborative Group, 1998; Smigel, 1998). The Breast Cancer Prevention Trial found that Tamoxifen reduced a woman's risk of breast cancer by 45% (Margolese, 1998); however, studies in Europe (i.e., Powles, Eeles, Ashley, Easton, Chang, Dowsett, Tidy, Viggers, & Davey, 1998) have been unable to confirm the preventative properties of Tamoxifen. Additionally, while Tamoxifen reduces a woman's risk for breast cancer it may increase her risk for endometrial cancer, pulmonary embolism, and deep vein thrombosis (Smigel, 1998).

Other preventative measures for breast cancer include prophylactic mastectomy, a surgical procedure that removes most but not always all of a woman's breast tissue before cancer is diagnosed (Healthfacts, 1996; Hubbard & Lewontin, 1996; King, Rowell, & Love, 1993). However, this is a procedure that few women without disease find appealing as it dramatically alters their physical appearance. Because the potential preventative measures currently available for breast cancer pose serious detriments or

side-effects, a woman who tests positive for a BRCA1 or BRCA2 mutation in her 30's could have up to 50+ years to watch and wait for the cancer to express itself with only the hope that through increased surveillance (mammograms, physical examinations, breast self-examinations) the disease may be diagnosed at an earlier and more curable stage (Lerman & Croyle, 1994). Feedman (1997) states that with genetic testing "scientists have built on the prognosis-diagnosis-treatment triad in the hope of predicting disease in its asymptomatic phase" (p. 2063). Kodish, Wiesner, Mehlman, and Murray (1998) conclude that genetic testing may prove to be a useful tool in controlling cancer if the identification of at-risk individuals can be coupled with proper interventions. Wroe, Salkavskis, and Rimes (1998) claim that the obvious benefit to genetic and other predictive testing lay in the early detection and possible prevention of disease.

Even without a cure for cancer, interest in genetic testing for cancer and other diseases continues to grow (Raffel, 1998). In a study by Lerman, Daly, Masny, and Balshem (1994), 75% of 121 first-degree relatives (FDRs) of ovarian cancer patients were interested in undergoing genetic testing for BRCA1. Jacobsen, Valdimarsdottir, Brown, and Offit's (1997), found that 81% of seventy-four FDRs of breast cancer patients were interested in being genetically tested, while Lerman, Seay, Balshem, and Audrain (1995) found 91% of 105 FDRs of breast cancer patients were interested. However, being interested in testing is no guarantee that the individual will actually submit to testing. A more recent study by Lerman, Hughes, Lemon, Main, Snyder, Durham, Narod, and Lynch (1998) found that 46% of 396 BRCA1 and BRCA2 linked family members declined to be tested for the genes. Lack of effective treatment options

is often cited as one of the main reasons that people refuse genetic testing. Marteau and Croyle (1998) state, "Uptake rates for genetic tests are higher when there are effective ways of treating or preventing the condition. If little can be offered, most people do not want information about their risk status" (p. 694).

In addition to the lack of quick and efficacious treatments for many genetic diseases, the possibility of loosing insurance coverage due to genetic discrimination presents a major obstacle in agreeing to be tested (Jacobsen, Valdimarsdottir, Brown, & Offit, 1997; Hubbard & Lewontin, 1996; Lerman, Hughes, et al., 1998; Macdonald, Doan, Kelner, & Taylor, 1996). Particularly in the United States, people are afraid of being tested or having their insurance company notified of the testing because they believe they may loose insurance coverage if they are found to carry a particular susceptibility gene. In Canada, where loosing one's insurance coverage is not a concern because of national health coverage, the main issue is the lack of efficacious preventative measures (Dove, 1998).

The future use of genetic testing seems to be quite problematic. It appears that people could benefit from the knowledge that they are susceptible to certain diseases and from the increased surveillance accompanying this knowledge. However, because of financial concerns and the apparent lack of preventative treatments for some diseases, people may refuse genetic testing. The question is how can health care professionals hope to persuade at-risk individuals to undergo genetic testing?

Overview of Study

The present study examined whether messages, similar to fear appeals used in previous health campaigns, might be effective in persuading individuals to undergo genetic testing for a fictional disease called Mitchell-Thomas Syndrome, MTS. Subjects were asked to imagine that during a routine office visit, their physician informs them that they might be at risk of currently having or someday developing MTS. The participants in this study were randomly assigned to one of eight different experimental conditions (see Appendix A for all eight messages) and completed a multi-item questionnaire concerning their perceptions, attitudes, and intentions to undergo the diagnostic testing offered in the survey message. A total of four hypotheses were tested to investigate whether the level of threat, type of test offered, and the temporal proximity of treatment to diagnosis affected subject's decision to undergo diagnostic testing.

As stated above, the messages utilized in this study were similar to fear appeals, which have been utilized for many years in order to persuade individuals to be tested for disease (Dillard, Plotnick, Godbold, Freimuth, & Edgar, 1996; Janis, 1967; Leventhal, 1970; Rogers & Prentice-Dunn, 1997; Smith, 1997; Witte, 1994; Witte, Berkowitz, Cameron, & McKeon, 1998). Fear appeals work by alluding to the severity of and an individual's susceptibility to a specific disease. It is expected that by telling individuals they are at risk for contracting a noxious or life threatening disease, their fear will increase and they will submit to diagnostic tests and/or specific treatments in order to prevent, treat, or cure the disease (Janis, 1967; Rogers & Prentice-Dunn, 1997; Witte,

1996). Years of research concerning fear appeals have provided numerous models that attempt to explain how and why fear appeals work.

Fear Appeals

Drive Models

Some of the earliest research on fear appeals (e.g., Hovland, Janis, & Kelly, 1953; Janis, 1967; and McGuire, 1968) viewed fear as an unpleasant emotional state that drove people to decrease the fear they felt by adopting different coping strategies. Janis (1967) postulated that fear increased a person's motivation to seek reassurances and to be more vigilant of perceived threats. This increased motivation leads to increases in message acceptance but only to a certain point. Janis (1967), as well as McGuire (1968), claimed that the relationship between fear and message acceptance was nonmonotonic; meaning a fear appeal works only if the arousal is kept at a moderate to high level but did not exceed a "critical point". The critical point in this model is when fear simply overwhelms the target. When this occurs, message acceptance decreases dramatically. If the critical point is breached, people become so afraid of the threat that they quit processing the message and employ defensive avoidance strategies in order to control their fear. This results in a nonmonotonic (inverted U-shape) relationship between arousal and message acceptance, where a moderate fear level is actually more effective than a high fear level.

Several older studies supported this nonmonotonic model of fear and message acceptance. Janis and Feshbach (1953) found that a mild or minimal fear appeal produced the most acceptance of a message about dental hygiene while the stronger fear appeal resulted in little or no change. Janis and Terwilliger (1962) found that individuals

who received strong fear appeals concerning smoking and lung cancer had stronger negative reactions than did subjects who received mild fear appeals. Specifically, subjects in the high fear condition were less likely to express anti-smoking attitudes, felt more emotional tension, and were more likely to reject the message than subjects in the mild fear appeal condition. However, later studies (e.g., Beck & Frankel, 1981; Rogers, 1983) have rejected the nonmonotonic model of fear appeals and have proposed more elaborate designs that allow for multiple avenues that individuals can utilize when coping with fear.

Parallel Response Model

Leventhal (1970) proposed a model that assumes two separate processes in which fear is controlled: danger control and fear control. Danger control responses are cognitive and focus on alleviating the threat by performing the recommended action. For example, if people smoke and receive a message warning them about the link between smoking and lung cancer, the danger control response would be to stop smoking. People are fearful of the threat (lung cancer) and takes steps to control this fear by doing something about the threat (stops smoking). However, the fear control response is more emotional and focuses on employing coping strategies that will alleviate the fear but do nothing about the threat. By using fear control they take no steps to control the threat, only the fear that they are experiencing. For example, individuals may cope with the fear of AIDS by convincing themselves that they are not susceptible or that only certain types of people, (e.g., those in non-monogamous relationships) acquire HIV and develop AIDS. They take no personal steps to control the threat (i.e., using condoms) but simply use

coping strategies that reduce the amount of fear that they feel (e.g., ignoring the problem, rationalizing that they are not at risk).

Protection Motivation Theory (PMT)

Rogers (1983) attempted to explain why and how Leventhal's (1970) process of danger control actually functioned. Rogers believed that there were three main components to a fear appeal: perceived susceptibility, perceived severity, and response efficacy. Self-efficacy was later added making a total of four components (Maddux & Rogers, 1983). Perceived susceptibility refers to people's beliefs that they are at risk of contracting or developing a particular disease. The perceived severity pertains to how deleterious or noxious a disease is assumed to be. Response efficacy involves whether the people believe that the recommended response to the disease will actually halt or cure the disease. Finally, self-efficacy refers to an individual's belief that he/she has the personal ability to follow through on the recommended responses. Rogers (1983) posited that an individual's protection motivation would be at its highest when all of these components were operating at high levels. In turn, this high level of protection motivation made attitude and behavior change more likely.

Rogers' (1983) model allows for two separate avenues when dealing with a fear appeal: adaptive responses and maladaptive responses. Adaptive responses (similar to danger control) are a function of both efficacy components (response and self) minus the costs of responding in the recommended fashion. If one believes that performing the recommended response will be effective and that the costs of the response are sufficiently low, then s/he will most likely use coping appraisals to mitigate the fear. The use of

coping appraisals is adaptive because it increases the likelihood that the recommended response will be performed. For example, as one's risk for heart disease increases it make sense to increase behaviors that have been proven to help in preventing heart disease (i.e., exercise, eating a low-fat/low-cholesterol diet). Increasing one's healthy behavior is an adaptive response aimed at controlling the fear by moderating the risk of developing the disease.

On the other hand, a maladaptive response (similar to fear control) begins with the intrinsic and extrinsic rewards the person receives from performing a particular behavior. Subtracting the severity of the disease and vulnerability of the individual from these rewards leads to threat appraisals or maladaptive responses. For instance, if a behavior (i.e., eating a high fat diet) is viewed as rewarding to the individual and the severity/vulnerability of the disease is seen as low, threat appraisals will be utilized and the recommendation to cut dietary fat is less likely to be accepted. In this model, fear has only an indirect role in influencing the appraisal of disease severity and personal vulnerability.

Using the PMT model, Rogers and Mewborn (1976) found that people were more likely to perform a recommended action if they believed a coping response would effectively avert the danger regardless of the noxiousness of the threat itself. Rippetoe and Rogers (1987) followed up previous research by examining the four components of this model in the context of breast self-examinations, BSE. They found that women who received a high response efficacy message were more likely to believe that BSE was an effective means of detecting and preventing breast cancer, while women who received a

low response efficacy message judged BSE to be less efficacious. Robberson and Rogers (1988) found that while health appeals should probably be negative in nature, health professionals should consider discussing different coping responses with their patients when trying to encourage behavior change. While Rogers and colleagues examined the components of this model in different contexts, little research on fear appeals has focused on the interaction of these components. In order to examine these interactions and in order to study the more direct effects of fear, Witte (1992) developed the Extended Parallel Processing Model.

Extended Parallel Processing Model (EPPM)

Witte's EPPM (1996,1994,1992) combines aspects of Leventhal's Parallel Response Model (1970) and Roger's Protection Motivation Theory (1983) to better explain how fear appeals can influence individuals as well as why fear appeals may fail to influence behavior. Like PMT, the four major components of EPPM are severity, susceptibility, self-efficacy, and response efficacy. These components combine to produce a threat factor and an efficacy factor which in turn influences whether a person will employ danger or fear control responses/strategies (i.e., Leventhal, 1970) when dealing with fear appeals.

Severity and susceptibility comprise the threat/hazard factor in EPPM and are the first elements that an individual must contend with in processing a fear appeal message. Individuals must appraise the situation based on their perception of the threat's severity and their personal susceptibility. According to EPPM, these two components must work concurrently in order to establish the necessary fear to motivate action. If a disease is not

perceived as severe, fear may not be achieved even if one is susceptible. For example, people generally do not worry too much about catching a common cold unless they are immunodeficient in some way or have severe respiratory problems. The common cold is simply not a severe disease for most people. Diseases like cancer or heart disease are generally considered more severe threats to one's health and well being.

In addition to perceiving the disease as severe, people must also perceive themselves as being susceptible to the threat. Even if the disease is incredibly severe, as is the case for the Ebola virus (Isaacson, 1988), if people do not perceive themselves as being susceptible (i.e., they live in the United States and not in Africa) they will not perceive this disease as major risk to their health and well being. These two components (severity and susceptibility) must work together to induce the moderate-high fear Witte (1994) claims is necessary to motivate an individual to appraise the efficacy aspects of the message. Messages that do not result in at least moderate perceived threat will not motivate a person to move on to the second appraisal of the model.

The second appraisal that must take place, according to EPPM, is one of efficacy both on an individual and response level. To reiterate, self-efficacy is the belief that one will be able to perform the recommended behaviors in order to decrease the risk of disease. For instance, if one does not believe he/she can adhere to a physician's recommendations to quit smoking it is less likely that s/he will comply with those recommendations. The second efficacy element is response efficacy and is the perceived efficacy of the response or treatment. Response efficacy deals with an individual's perception of the effectiveness of the recommended treatment or behavior. If one

believes that the recommended treatment/behavior will not be effective in treating the disease s/he is unlikely to comply.

EPPM states that if the response and self-efficacy are perceived to be greater than the perceived threat, danger control responses/strategies (i.e., Leventhal, 1970) will be the dominant method used by the individual to reduce the fear (Witte, 1994; Witte, et. al., 1998). Danger control (protection motivation) is an adaptive strategy in which the individual attempts to control the danger of the threat by performing the recommended treatment. Again, this is a cognitive process by which a person thinks about the threat and how performing the recommended behaviors (treatment) will or will not prevent or control the threat. In essence, danger control strategies guide people to accept the fear appeal message and to perform the recommended behaviors because they believe the disease or condition can be successfully treated.

Conversely, if the response or self-efficacy is perceived to be inadequate in handling the threat, the individual will employ fear control responses or strategies. Again, fear control is an emotional response that results in maladaptive strategies that simply control the fear that the person is feeling but does not reduce the actual threat. Fear control can take many forms including perceived manipulation, message minimization, and counterarguing. "More specifically, people try to control their fear by suppressing thoughts of the danger (defensive avoidance) or by reacting against the communicator or message" (Witte, 1994, p.116). The person does not think about how the recommended treatment may mitigate the threat but merely assuages the fear concerning the threat.

Witte (1996) found that high threat/high efficacy messages produced the greatest message acceptance while high threat/low efficacy messages produced the least message acceptance. Even though threat is high in both conditions, an individual given a message with high efficacy believes that something can be done about the threat and will be more likely to follow recommended treatment/behaviors. People in the low efficacy condition feel that nothing can be done about their risk of disease except to control the fear they are experiencing. Therefore, in order to produce message acceptance in a patient using fear appeals, a threat to an individual's health or welfare must be established followed by an efficacious treatment or preventative measure. When examining the traditional and genetic models of disease, it appears that fear appeals are well suited to the traditional biomedical model but may also work with the newer genetic testing model though possibly to a less effective degree.

For example, if a 45-year-old man presents to his physician with urination problems, such as bloody urine or sudden urinary retention, it may be a sign he has prostate cancer. The man will almost assuredly be told of this possibility (threat) and also told that specific diagnostic tests (digital exam, prostate specific antigen, and biopsy) can confirm or exclude this possibility. In addition, the physician will most likely inform this man about the possible treatment alternatives (response-efficacy) and what will be expected from him personally (self-efficacy). According to EPPM, if the threat and efficacy are both sufficiently high, the man will obtain the diagnostic tests. If these tests are negative, another series of tests may be discussed and performed in order to diagnose

the causes of the man's urinary difficulties. If the tests are positive, the appropriate treatment regimens will promptly begin.

Conversely, in the genetic model, individuals are presented with an opportunity to be tested while they are asymptomatic. Additionally, the diagnostic test may only indicate that they have a very high probability of developing a specific disease (threat) at some point in their life. They may also be told that the only thing that can be immediately done (response efficacy) is to repeatedly test for changes in the progression of the disease. While they are still at very high risk of developing the disease, which leads them to process the threat/hazard factor in the model, the response efficacy of the treatments is perceived to be low. According to EPPM these individuals will employ fear control strategies rather than danger control strategies.

Fear, in this model, plays only an indirect role in influencing the use of danger control strategies. As the perception of threat increases the incividual experiences more fear, which in turn leads the formation of what Witte (1992) calls a feedback or reappraisal loop. Once in this loop, the person reevaluates the threat and efficacy components of the message. If the subject still perceives the efficacy as greater than the threat, adaptive (danger control) strategies will be employed. However, if the subject finds that the threat outweighs the efficacy, maladaptive (fear control) strategies will be utilized.

Hypotheses

While it is true that a genetic test may give individuals a more exact representation of their life-long disease status, this study assumes that subjects who receive a high threat genetic testing message will adopt more maladaptive (fear control) strategies than subjects who receive high threat traditional messages. No differences are expected for subjects who receive low-threat messages. Specifically, the first hypothesis states:

> H1: Subjects in the genetic condition who receive high threat messages will utilize significantly more maladaptive coping strategies than subjects who receive high threat messages in the traditional condition.

Temporal Proximity of Treatment

Disease prevention is, by its very nature, distal or prospective in its effect. Physicians do not prescribe medication for high blood pressure or diabetes thinking that the condition will go away in a few days. Additionally, drinking a glass of wine or taking a daily aspirin is not meant to prevent a heart attack tomorrow but rather years from now. People enjoy having some sense of control over the treatment they undergo and treating a disease early may not only increase the chance of full-recovery but may also enhance their perception of control.

In the traditional model of medicine, treatment begins as soon as the individual has been diagnosed (proximal). Once a person has been diagnosed with cancer, treatment begins almost immediately with surgery, chemotherapy, radiotherapy, or a combination of treatments. The problem with genetic testing is that many treatment options cannot begin immediately after diagnosis; only once the person becomes symptomatic (distal).

Therefore, affording an individual treatment options early in the disease pathology (proximal) should be seen as more efficacious because the individual has more perceived control over the disease at earlier stages. Specifically, the second hypothesis states:

H2a: Regardless of testing condition (traditional or genetic), treatments that are perceived to that begin shortly after diagnostic testing is complete (proximal) will be perceived as more efficacious than treatments that can only begin in the distant future (distal).

H2b: Regardless of testing condition (traditional or genetic), subjects who perceive the prescribed treatment as proximal to diagnosis will be significantly more likely to undergo diagnostic testing.

Besides examining the difference in subject's intent to undergo testing after the initial proximal vs. distal messages (see Appendix A) this study included a within-subject replication where each subject received a second proximal treatment message (see Appendix B for second message). This replication allows for enhanced testing of H2b by comparing the subject's intention to undergo testing between the first and second messages. It is hypothesized that proximal treatment options will be perceived as more efficacious than distal treatment options regardless of the type of testing (genetic or traditional). Therefore, subjects who receive a distal first message should be more inclined to undergo testing after reading the second (proximal) treatment message. No change in intent is expected for subjects who receive a proximal first message because the second message will simply be a reiteration of the first.

Threat

As mentioned above, perceptions of threat (severity + susceptibility) is a very important component in the EPPM model. If subjects believe that the disease is very severe or that they are likely to develop the disease they are more likely to accept the

given message, which in this study refers to their submitting to diagnostic testing (Witte, 1994). To reiterate, Witte (1996) found that high threat/high efficacy messages produced the greatest message acceptance while high threat/low efficacy messages produced the least message acceptance.

It is assumed that subjects will perceive traditional testing to be more efficacious than genetic testing. Therefore, manipulating the components of threat should result in differential effects in the intent to undergo two types of diagnostic testing. Consequently, a high threat message in the traditional model should produce more intent to undergo testing than a low threat traditional message. Conversely, a high threat message in the genetic model should produce less intent to undergo testing than a low threat message. Specifically, the third hypothesis of this study states:

> H3: There will be an interaction between the type of test (traditional or genetic) and the level of threat in the message such that there will be a significant increase in intent to be tested as the threat of disease increases for subjects in the traditional test condition. Conversely, there will be a significant decrease in intent to be tested as threat increases for subjects in genetic test condition.

A subject's intention to undergo testing should be highest in the high threat/traditional condition and lowest in the high threat/genetic condition. Subject's testing intention in the low threat/genetic and low threat/traditional conditions should lie somewhere between the high threat conditions.

CHAPTER II

METHODS

Overview

This study was a 2 (traditional vs. genetic testing) x 2 (high vs. low threat) x 2 (proximal vs. distal treatment) factorial design. There was also a within-subjects replication of the temporal proximity of the treatment portion of the design with all subjects receiving a second proximal message (see Appendix B) after they read and answered questions concerning an initial proximal or distal message (see Appendix A).

Along with the independent variables that make up the study design, several moderating variables were examined. These included age, sex, ethnicity, and education level. Dependent variables included the perception of the threat (e.g. "The message I read about MTS made me feel anxious"), intent to undergo diagnostic testing (e.g. "I intend to undergo the diagnostic test to determine if I have Mitchell-Thomas Syndrome"), and the perceived efficacy of the prescribed treatment (e.g. "I believe that if I was found to have MTS that it could be successfully treated").

Experimental Messages

The messages in this study involved presenting the subject with a hypothetical situation, which describes a fictitious disease and a specific diagnostic procedure. This type of message design has previously been employed in message framing research (e.g., Tversky & Kahnmeman, 1992; Rothman & Salovey, 1997). The messages in this study began by explaining a hypothetical scenario in which subjects were asked to pretend that

they're visiting their physician because they are not feeling well (traditional condition) or that it is time for their annual physical (genetic condition). After being examined, they are told by their physician that they may have a newly discovered disease called Mitchell-Thomas Syndrome, MTS. Depending on the severity condition of the message (high or low) subjects were told that MTS is life threatening (high) or that it causes prolonged but non-deleterious illness (low). The scenario continued by informing subjects that MTS attacks the liver and kidneys making it difficult for the body to rid itself of toxins. Additionally, susceptibility of the threat was manipulated by telling subjects in the high threat condition that MTS strikes 1 out of every 500 people (high susceptibility) while subjects in the low threat condition were told that MTS affects only 1 out of every 5,000 people (low susceptibility). Subjects also read that MTS most often affects older individuals (65-75) but can occur in people as young as 18 years old.

After reading about the disease, subjects received information about one of two possible diagnostic procedures (traditional or genetic). In the traditional model, subjects were informed that a diagnostic test exists that will tell them whether or not they have MTS at the present time. The message for the genetic model explained that a test exists that can inform the subjects as to their future probability of contracting this disease. The genetic message went on to explain that if the test were found to be positive there is an 80% chance the subject would develop MTS by the time they are 70 years old.

The initial message also presented information concerning possible treatments and their temporal proximity to the diagnostic test. Subjects in the proximal condition read that a very effective treatment for MTS was available and could start immediately

after diagnosis regardless of whether the diagnostic test was traditional or genetic. Conversely, individuals in the distal condition received a message explaining that there were treatments available, but that they were useless until the later stages of the disease and that it may be years or even decades before the treatment is worthwhile. Again, as a further test of the effect of proximal versus distal treatments, subjects received a second message after they completed the questionnaire concerning the initial message. This second message was proximal and informed all subjects about a new treatment available to them right away. In summary, there were four conditions [(high vs. low threat) x (proximal vs. distal treatment)] for each type of diagnostic model (genetic or traditional), for a total of eight different initial message conditions (see Appendix A) with a second proximal message (see Appendix B) for each subject following the initial message.

Witte's (1993) recommendations in creating effective fear appeals were followed in order to insure that the messages created followed the format of fear appeals. According to Witte (1993), the structural components of the fear appeal must first be defined for a specific audience. In the case of this study, subjects were asked to imagine that they were at risk for a specific disease, MTS. While they were not actually at risk for MTS, the message they received was specific in what they could expect from the disease and the diagnostic procedure. Witte's (1993) second recommendation is that message stylization should be used to manipulate the severity of the threat. The high threat messages utilized intense and graphic language to describe the disease, alluding to the possibility of death, while the low threat messages used more neutral language and alluded to prolonged illness but not death. In addition, perceived susceptibility was

manipulated to help increase the fear in the high threat condition and assuage subject's fear in the low threat condition.

Witte's (1993) third recommendation is that possible-confounding variables in the messages should be controlled for as much as possible. In this study, variables such as accuracy, objectivity, reading level, length, repetition, order, and complexity were controlled for by employing the same format in each of the eight messages. The only differences in the messages were in the areas of type of testing, level of threat (severity and susceptibility), and whether the treatments are proximally or distally related to the diagnostic procedures. Finally, the messages advocated a specific type of behavior (diagnostic test) for dealing with MTS. The messages did not address the general health and welfare of the subjects, but only their possible acceptance of the recommended behavior and their intention to undergo the diagnostic test.

One caveat concerning the construction and use of this study's experimental messages must be noted. Although Witte's (1993) recommendations were followed in the creation of the messages used in this study, these experimental messages were not fear appeals in the traditional sense. The major difference between the messages employed in this study and more conventional fear appeals is that the "action" called for in this study could not in any way alleviate the risk of developing MTS. In a conventional fear appeal the proposed action or recommended response actually reduces one's risk of developing or contracting disease (e.g., using condoms during sex to protect against HIV/AIDS). The recommendations in this study (diagnostic testing) could only confirm or reject the possibility that an individual had or would probably develop MTS

later in life, but in no way decreased the actual risk of developing the disease. Nevertheless, one of the main functions of genetic testing, and diagnostic testing in general, is to inform individuals as to their personal risk of developing a specific disease. Therefore, while the experimental messages in this study were not fear appeals in a traditional sense, they did present subjects with a realistic scenario concerning diagnostic testing and disease. Furthermore, the components of the EPPM model were still functional and testable, because subjects needed to take into account the threat of the disease and the efficacy of the proposed action as if they were faced with a more conventional fear appeal.

Participants and Statistical Power

The sample for this study (N = 457) was drawn from the general adult population of one county in the southwestern United States. Subjects were individuals who had been summoned to be potential jurors and told to report to the county courthouse located in a large southwestern city. Subjects in this pool are randomly drawn from the county population on the basis of age and possession of a valid state driver's license. They were informed, via mail, to report to the county courthouse on a specific day and wait in an assembly room before reporting to a courtroom to be questioned as to their ability to serve as a juror. Previous research (see Alvaro & Burgoon, 1995) has confirmed that this sub-population is very representative of the larger county population in the areas of age, sex, and ethnicity. Individuals utilized in the present study ranged in age from 18-80 years old with an average age of approximately 42 years old (the mean age for county residents from 18-99 is approximately 42 years). The ethnicity distribution for the

sample used in this study was 75.7% Caucasian, 12.0% Hispanic, 2.6% African-American, 1.5% Native-American, 0.9% Asian, and 4.5% Other. The final 2.8% of the study population were considered missing because they did not provide an answer for the question concerning ethnicity. The "Other" category for ethnicity allowed people to write-in a description of their ethnic background and was generally distinct from any of the other categories listed in the survey (e.g., Filipino). The statewide ethnicity distribution is 63.7% Caucasian, 28.7% Hispanic, 3.8% African-American, 3.5% Native-American, 2.4% Asian, and 13.3% Other. In addition, more females (61%) than males (37%) participated in this study (missing = 2%) as compared to the county distribution of 51.2% female and 48.8% male. In terms of education, approximately 88% of the respondents in this study had received at least 1-2 years of college.

A standard analysis of variance, ANOVA, sample size calculation using GPower indicated that a total of 457 subjects (at least 50 per cell) provided sufficient power (.8945) to detect small to moderate effect sizes (.20). A small effect size was expected for two reasons. First, EPPM suggests that fear produces only indirect effects on intent and actual behavior. Witte (1994) found that fear did affect intentions but in an indirect and modest manner. Since this study examined only the intention to undergo diagnostic testing, a strong effect on this specific variable was unlikely. Second, though Witte's (1993) guidelines were followed in creating the fear appeals used in this study, it is still quite difficult to induce a high fear in subjects. This is partially due to ethical considerations of working with human subjects and the fact that the subjects will only interact with the researcher/survey for a very short time. Therefore, the difference in fear

arousal between subjects will not be as great as if the subjects had received intensely graphic messages over an extended period of time.

Procedure

Subjects were approached while waiting in the assembly room and told that the author was from a university and was conducting a study on diagnostic testing and disease. Subjects were asked if they would like to participate in the study by reading a couple of short messages and filling out a questionnaire. Subjects were informed that their participation was completely voluntary and that they could cease their participation at any time. Those who agreed to participate were given a survey consisting of a description of the study, the first and second message, the questionnaire, and a debriefing form.

Each subject began by reading a description of the study (see Appendix C for study description), which explained the basic nature of the study and what was expected of the subject. After reading the study description, the subject read one of the eight initial messages for this study (see Appendix A).

After reading the first message, subjects began the questionnaire portion of the survey (see Appendix D for complete questionnaire) by answering several Likert-type questions pertaining to their perception of threat (e.g., "I believe that MTS is a serious disease"). Subjects were then asked about their intent to undergo the particular type of diagnostic testing advocated by the message they read (e.g., "I intend to undergo the diagnostic test to determine if I have Mitchell-Thomas Syndrome"). Subjects were also asked several questions regarding their ability to undergo the recommended test and their

perception of the efficacy of the diagnostic test (i.e., "I believe that being tested for MTS would be beneficial for me").

After answering all of the questions concerning the initial message, every subject read the second message (proximal) about a new treatment for MTS (see Appendix B). After reading the second message they answered another short series of questions. This consisted of questions about intention to undergo testing (e.g., "I would undergo the diagnostic test to determine if I have MTS, so I could use this new treatment") and perceived treatment efficacy (e.g., "I believe that this new treatment for MTS would be effective in treating this disease") (see Appendix D). After answering all the questions concerning the second message, subjects were asked to provide demographic information, including age, sex, education level, and ethnicity (see Appendix D).

Finally, subjects read the study debriefing form (see Appendix E for debriefing form). This form explained that MTS was a purely fictitious disease and that the subjects were in no real danger of becoming sick or dying from this disease. They were informed that this study was intended to examine the difference between genetic and more traditional forms of diagnostic testing and that they had received one of eight different messages concerning this issue. The subjects were thanked for their participation and asked to return the survey to the researcher.

Measures

All measures employed a 5-point Likert scale format, utilizing strongly agree and strongly disagree as anchors unless otherwise specified (strongly agree = 1, strongly disagree = 5). The demographic variables of sex, age, ethnicity, and level of education were obtained via open-ended (e.g., Age) or multiple choice questions (e.g., Ethnicity: Caucasian, African-American, Hispanic, et cetera).

Fear assessment was utilized as an independent variable and computed as the mean of a four item scale using questions that asked if subjects agreed or disagreed that the message about MTS made them feel frightened, nervous, anxious, and/or tense ($\alpha = .86$). It is important to note that this variable is simply an indicator of perceived fear and not actual fear (Witte, 1994).

In addition, variables for perceived threat, perceived efficacy of the treatment, message derogation, and source derogation were constructed using multi-item scales. Perceived threat ($\alpha = .88$) was assessed by asking subjects if they agreed/disagreed that MTS was a "serious" and "severe" disease. Treatment efficacy ($\alpha = .83$) was measured with two questions that asked subjects if they agreed/disagreed that the treatments described in the message would be "effective" and "successful" in treating MTS.

Source derogation ($\alpha = .85$) was assessed via two items that asked subjects if they agreed/disagreed that receiving this type of information (about MTS) from their physician would make them feel "exploited" or "manipulated." Message derogation ($\alpha = .76$) was measured with a three item scale consisting of the statements, "I think the information about MTS in this message was probably exaggerated," "I think the

information about MTS in this message was boring," and "I think the information about MTS in this message was probably distorted." Both message and source derogation have been utilized as examples of maladaptive strategies in previous research (Witte, 1992; Witte, et. al., 1998) and were used as such in this study.

The dependent variable of intent to undergo testing was measured by asking subjects if they agreed or disagreed with the statement, "I intend to undergo the (diagnostic/genetic) test to determine if I have/ will someday develop Mitchell-Thomas Syndrome". A second intent question was asked after the second message and stated, "I would undergo the MTS (diagnostic/genetic) test to determine if I have/will someday develop Mitchell-Thomas Syndrome, so I could use this new treatment".

Data Analysis

Data analysis for this study consisted of univariate as well as multivariate analysis of variance tests. All dependent variables were tested using factorial ANOVA procedures (two-tailed) on SPSS 5.0 for Windows with $\alpha = .05$ in all tests. The first hypothesis predicted that subjects in the high threat genetic condition would use significantly more maladaptive (fear control) strategies than subjects in the high-threat traditional condition. The analysis for H1 consisted of a series of planned comparisons in a 2 (high vs. low threat) x 2 (traditional vs. genetic) factorial ANOVA design. The number of maladaptive strategies employed by subjects in traditional and genetic conditions were compared within high threat and low threat conditions.

Main effect tests for perceived efficacy of the treatment and intent to undergo testing in the distal and proximal conditions (H2a and H2b) were conducted via

univariate ANOVA procedures. Hypothesis 2a predicted that subjects would perceive treatments that are proximally related to the diagnostic test as more efficacious than treatments distally related to the diagnostic test regardless of threat level or type of test. Additionally, H2b predicted that subjects would be more likely to submit to testing if the treatments were proximally related to the testing than when distally related to the diagnostic testing.

To further examine H2b, a 2 (posttest 1 vs. posttest 2) x 2 (distal vs. proximal) repeated measures ANOVA test was employed to examine any differences in subjects' perceived treatment efficacy and intent to undergo testing from the initial message to the second message. This analysis employed a dual posttest format with subjects' mean scores for perceived efficacy and intent to be tested for the initial message (posttest 1) of the survey which were compared to scores from the same questions for the second message (posttest 2).

This hypothesis, H3, predicted an interaction between threat and type of diagnostic test. This hypothesis was tested using a 2 (high vs. low threat) x 2 (traditional vs. genetic) factorial ANOVA procedure to determine which of the four interaction conditions (high threat genetic, high threat traditional, low threat genetic, and low threat traditional) resulted in the most intent to undergo testing. While the main effects for this analysis were obtained, the interaction effect was of primary interest for this particular hypothesis.

Although H3 predicted that subjects in the high threat traditional would indicate the most intent to undergo testing and that subjects in the high threat genetic would be the

least inclined to be tested, no predictions were made as to the position of the other two conditions (low threat genetic and low threat traditional). Therefore, logistic regression analyses using STATA 5.0 for Windows were planned as a follow-up analysis of H3. These secondary analyses were used to follow-up the ANOVA tests by examining the specific interaction effect between the variables of threat and type of test on perceived and manipulated threat. In addition, these secondary analyses were utilized to probe for any moderating effects among the demographic variables of age, education, ethnicity, and gender. The logistic regression used for this analysis was forced meaning that the independent and moderating variables were entered into the model at the same time and not in a forward or backward step procedure.

CHAPTER III

RESULTS

Randomization Tests

To insure that the techniques utilized in this study were successful in randomly assigning participants to experimental conditions, Chi-square tests (gender, ethnicity, and education) and factorial ANOVA procedures (age) were employed to test for systematic differences between conditions. No significant differences in gender, age, ethnicity, or education were found for type of test, level of threat, or temporal proximity of treatment (see Tables 1, 2, & 3). Examinations of high and low threat conditions within traditional and genetic testing also proved to be nonsignificant. Therefore, it was concluded that the randomization techniques employed in this study were successful.

Manipulation Tests

Manipulation checks for fear and perceived threat by level of threat were conducted using standard univariate ANOVA procedures. These tests were conducted in order to confirm that the experimental conditions (high vs. low threat) created the desired psychological responses in the study participants. A significant main effect was found for perceived threat, $\underline{F}\,(1, 453) = 195.75$, $\underline{p} < .001$, $\eta^2 = .302$, with subjects in the high threat condition more likely ($\underline{M} = 1.74$) to agree that MTS was a serious and severe disease than subjects in the low threat condition ($\underline{M} = 3.05$). A significant main effect was also found for fear, $\underline{F}\,(1, 452) = 13.97$, $\underline{p} = .003$, $\eta^2 = .019$, with high threat subjects

more likely to agree (M = 3.27) that the message made them more frightened, nervous, anxious, and tense than subjects in the low threat condition (M = 3.62).

Hypothesis 1

This study's first hypothesis, H1, predicted that subjects in the high threat genetic testing condition would utilize significantly more maladaptive strategies than subjects in the high threat traditional condition. To reiterate, maladaptive strategies are those in which subjects attempt to only control their fear without actually taking any action against the threat (e.g., message or source derogation, counter-arguing).

Along with the more traditional maladaptive strategies of message and source derogation, the subject's perception of the test being beneficial or simply a waste of time were also used as measures of maladaptive strategies. Subjects were also asked if the agreed or disagreed with the statement "I will not submit being tested for MTS regardless of what my physician tells me."

Several 2 (level of threat) x 2 (type of test) one-way ANOVA planned comparisons were employed to examine differences between high threat genetic and high threat traditional conditions for the maladaptive strategies mentioned above. The design for each of these comparisons (-1, 0, 0, 1) allowed for the testing of differences between the high threat conditions only (traditional = -1 and genetic = 1) while both of the low threat conditions (traditional and genetic) were set at zero. Since direction was stipulated (genetic = more maladaptive strategies) one-tailed significance test results were reported. Each test was adjusted for unequal variances and the adjusted test score, degrees of freedom, and significance level were reported.

A significant difference was found between the traditional and genetic conditions for subjects not wanting to undergo testing regardless of what their physician said, t (202) = 2.576, $p_{\text{one-tailed}}$ = .005. Subjects in the genetic testing condition agreed with the statement "I will not submit to being tested for MTS, regardless of what my physician tells me" to a greater degree (M = 4.33) than subjects in the traditional condition (M = 4.67). A significant difference was also found between subjects in traditional and genetic high threat conditions when asked if they thought being tested would be beneficial or a waste of time. Subjects in the traditional condition (M = 1.70) were significantly more likely to agree that diagnostic testing would be beneficial than subjects in the genetic condition (M = 2.29), t (213) = 3.813, $p_{\text{one-tailed}} < .001$. Subjects in the genetic testing were significantly, t (209) = 4.083, $p_{\text{one-tailed}} < .001$, more likely to agree that the diagnostic test was a waste of time (M = 3.96) than subjects in the traditional condition (M = 4.53). No significant differences were found for the maladaptive strategies of message, t (220) = 0.289, $p_{\text{one-tailed}}$ = .387, or source derogation, t (220) = 0.076, $p_{\text{one-tailed}}$ = .470.

Table 1

Age, Sex, Ethnicity, and Education by Type of Diagnostic Test

	Type of Diagnostic Test		
	Traditional	Genetic	Significance & p-value
Age:			$F(1,440) = .224$, $p = .637$
Mean;SD	42.16 (13.3)	42.75 (13.74)	
Sex:			$\chi^2(1df) = .088$, $p = .766$
Male:	37.7%	36.4%	
Female:	62.3%	63.6%	
Ethnicity:			$\chi^2(13df) = 12.60$, $p = .479$
Hispanic	11.9%	12.8%	
African-American	2.7%	2.8%	
Native American	2.2%	0.9%	
Caucasian	77.9%	78.0%	
Other	5.3%	5.5%	
Education:			$\chi^2(8df) = 5.48$, $p = .705$
Secondary or Trade	10.4%	8.2%	
1-2 years college	55.4%	56.4%	
2+ years college	32.6%	34.6%	
Other	1.6%	0.8%	

Note: all significance tests were two-sided with $\alpha = .05$

Table 2

Age, Sex, Ethnicity, and Education by Level of Threat

	Level of Threat		
	High	Low	Significance & p-value
Age:			$F(1,440) = .024$, $p = .877$
Mean;SD	42.38 (13.4)	42.53 (13.7)	
Sex:			χ^2 (1df) = .102, p = .750
Male:	37.8%	36.3%	
Female:	62.2%	63.7%	
Ethnicity:			χ^2 (13df) = 14.73, p = .325
Hispanic	13.4%	11.4%	
African-American	1.8%	3.6%	
Native American	1.3%	1.8%	
Caucasian	77.2%	78.6%	
Other	6.3%	4.6%	
Education:			χ^2 (8df) = 8.70, p = .369
Secondary or Trade	10.4%	8.2%	
1-2 years college	55.4%	56.4%	
2+ years college	32.6%	34.6%	
Other	1.6%	0.8%	

Note: all significance tests were two-sided with $\alpha = .05$

Table 3

Age, Sex, Ethnicity, and Education by Temporal Proximity of Treatment

	Proximity of Treatment		
	Distal	Proximal	Significance & p-value
Age:			$F(1,440) = .884$, $p = .348$
Mean;SD	43.01(13.37)	41.87 (13.74)	
Sex:			
Male:	35.4%	38.8%	χ^2 (1df) = .568, p = .451
Female:	64.6%	61.2%	
Ethnicity:			χ^2 (13df) = 16.10, p = .244
Hispanic	10.5%	14.4%	
African-American	2.2%	3.2%	
Native American	2.2%	0.9%	
Caucasian	80.7%	75.0%	
Other	4.4%	6.5%	
Education:			χ^2 (8 df) = 10.32, p = .244
Secondary or Trade	10.0%	8.6%	
1-2 years college	55.8%	55.9%	
2+ years college	33.3%	33.8%	
Other	0.9%	1.7%	

Note: all significance tests were two-sided with $\alpha = .05$

Hypothesis 2a

The first half of this study's second hypothesis, H2a, predicted that subjects would perceive treatments that were proximally related to diagnostic testing as more efficacious than treatments that were distally related to diagnostic testing. Subjects in the proximal condition were told that a treatment for MTS was available and that they could start this treatment as soon as they were diagnosed with MTS or found out they were at risk of getting MTS in the future. Conversely, subjects in the distal condition were told that a treatment was available but that it could only be used in the latter stages of the disease. Therefore, if they were found to have or were at risk of developing MTS, they would have to wait, possibly for decades, before this treatment could be utilized. Support for H2a was found using univariate ANOVA tests to examine differences in perceived treatment efficacy, perceived treatment success, perceived benefit of the treatment, and whether the subject would want to start the treatment soon after being tested.

A significant main effect was found on perceived treatment efficacy for proximity of treatment, $\underline{F}(1, 443) = 145.55$, $\underline{p} < .001$, $\eta^2 = .032$, with subjects in the proximal condition perceiving the treatment as more efficacious ($\underline{M} = 2.35$) than subjects in the distal condition ($\underline{M} = 2.72$). Likewise, subjects who received a proximal treatment message felt that the treatment would be significantly more successful ($\underline{M} = 2.20$) than subjects who received a distal message ($\underline{M} = 2.44$), $\underline{F}(1, 451) = 6.38$, $\underline{p} = .011$, $\eta^2 = .014$. Subjects in the proximal condition also believed that receiving the proposed treatment for MTS would be more beneficial ($\underline{M} = 1.94$) than subjects in the distal condition ($\underline{M} = 2.28$), $\underline{F}(1, 448) = 8.53$, $\underline{p} = .004$, $\eta^2 = .019$. Finally, subjects in the

proximal condition were significantly, $\underline{F}$ (1, 452) = 24.34, $\underline{p} < .001$, $\eta^2 = .051$, more interested in starting the treatment as soon as possible after being diagnosed ($\underline{M} = 1.65$) than subjects in the distal condition ($\underline{M} = 2.16$). As predicted, subjects felt that treatments beginning shortly after diagnosis (proximal) were more efficacious than treatments that were delayed after diagnosis (distal).

Hypothesis 2b

The second part of hypothesis two, H2b, predicted that individuals who were offered proximal treatment options would be more inclined to submit to the diagnostic testing than individuals offered distal treatment options, regardless of whether the test is traditional or genetic. This prediction comes straight from EPPM, as people who perceive a recommended response to a threat as highly efficacious are more likely to employ danger control (adaptive) strategies and perform the advocated behavior than those who perceive the response as having little efficacy. Support for this hypothesis was found using univariate ANOVA tests as well as within subject repeated measures procedures.

A significant difference between subjects in the proximal and distal conditions was found for intent to be tested, $\underline{F}$ (1, 449) = 9.10, $\underline{p} = .003$, $\eta^2 = .020$. Subjects in the proximal condition were more likely to agree to be tested ($\underline{M} = 2.09$) than subjects in the distal condition ($\underline{M} = 2.52$). Subjects who thought the treatment would be beneficial, successful, and efficacious (proximal condition) were more willing to undergo the diagnostic testing than subjects in the distal condition who thought the treatment would be less effective.

A significant temporal proximity of test (distal vs. proximal) by test (posttest 1 vs. posttest 2) interaction was found using repeated measures ANOVA techniques when examining subjects' answers to questions concerning intent to be tested following the second message, $\underline{F}(1, 443) = 14.95$, $\underline{p} < .001$, $\eta^2 = .033$. Subjects who received a distal first message indicated a greater increase in intent to be tested after reading the second proximal message than subjects who received a proximal first message (see Table 4).

Furthermore, subjects who received a distal first message and a proximal second message rated the second treatment as more beneficial than the first; whereas, subjects receiving two proximal messages showed no significant change (see Table 5). This difference in perceived benefit between the first and second message resulted in a significant test by temporal proximity of treatment interaction, $\underline{F}(1, 441) = 7.425$, $\underline{p} = .007$, $\eta^2 = .017$. This same interaction between test and temporal proximity of treatment was also found when subjects rated the perceived efficacy of the treatments, $\underline{F}(1, 443) = 25.631$, $\underline{p} < .001$, $\eta^2 = .055$. Subjects who received a distal first message rated the treatment in the proximal second message as much more effective in treating MTS than the treatment option offered in the first message. However, subjects who received two proximal messages did not rate the efficacy of the treatment options as significantly different (see Table 6).

Table 4

Mean Scores on Intent to Undergo Testing for Message by Distal or Proximal Condition

	Treatment Condition in First Message	
	Distal	Proximal
Posttest 1*	2.50	2.09
Posttest 2**	1.90	2.01

Note: Lower scores indicate more intent to undergo diagnostic testing.
* The first posttest followed the first message containing information on either a proximal or distal treatment for MTS.
** The second posttest followed the second message that presented information stating that a proximal treatment option now existed. This second message was given to participants in both the distal and proximal treatment conditions.

Table 5

Mean Scores on Perceived Benefit of Testing for Message by Distal or Proximal Condition

	Treatment Condition in First Message	
	Distal	Proximal
Posttest 1*	2.26	1.93
Posttest 2**	2.02	1.94

Note: Lower scores indicate more perceived benefit of undergoing diagnostic testing.
* The first posttest followed the first message containing information on either a proximal or distal treatment for MTS.
** The second posttest followed the second message that presented information stating that a proximal treatment option now existed. This second message was given to participants in both the distal and proximal treatment conditions.

Table 6

Mean Scores on Effectiveness of Treatment for Message by Distal or Proximal Condition

	Treatment Condition in First Message	
	Distal	Proximal
Posttest 1*	2.73	2.35
Posttest 2**	2.32	2.45

Note: Lower scores indicate more perceived treatment efficacy.
* The first posttest followed the first message containing information on either a proximal or distal treatment for MTS.
** The second posttest followed the second message that presented information stating that a proximal treatment option now existed. This second message was given to participants in both the distal and proximal treatment conditions.

Hypothesis 3

The final hypothesis of this study, H3, proposed an interaction effect between the type of test and the level of threat on subject's intention to undergo testing. Specifically, it was assumed that intent to be tested would be highest among subjects in the high threat/traditional condition and lowest in the high threat/genetic condition. Scores for subjects in the two low threat categories were assumed to lie somewhere between the two high threat conditions. This was tested by examining the F-test for the interaction in a 2 (high vs. low threat) x 2 (traditional vs. genetic) factorial ANOVA.

There was no significant interaction effect for threat by type of test on intent to undergo testing, $\underline{F}\,(1, 447) = 0.818$, $\underline{p} = .366$, $\eta^2 = .002$. In fact, subjects in the low threat/genetic condition were the least likely to be tested ($\underline{M} = 2.83$) followed by subjects in the high threat/genetic condition ($\underline{M} = 2.59$). However, type by threat had no effect on intentions of subjects in the traditional conditions as the mean for intent to be tested was exactly the same for both groups ($\underline{M} = 1.89$). Nonetheless, as with H1, a significant main effect for type of test (genetic or traditional) was found, $F\,(1, 447) = 35.07$, $p < .001$, $\eta^2 = .073$, with subjects in the traditional condition being more likely to undergo testing ($M = 1.89$) than subjects in the genetic condition ($M = 2.71$).

Logistic Regression Analysis

Because the analysis of variance tests for H3 failed to confirm the predicted interaction, a forced logistic regression using STATA 5.0 for Windows was performed to determine which specific demographic and independent variables may have moderated the influence of perceived threat and type of test on a subject's decision to undergo

diagnostic testing. The variable of intent was transformed into a binary variable with YES = 1 and NO = 0. Subjects who answered with a 1 or 2 (strongly agree or agree) on the 5-point Likert scale for intent to be tested were recoded as YES responses while subjects who answered 4 or 5 (disagree or strongly disagree) were recoded as NO responses. Individuals who chose 3 (neutral) were eliminated resulting in a reduction of 60 subjects for this particular analysis (N = 397). The variables of threat and type of test were combined into an interaction term and tested along with threat, type of test, gender, age, race, education level, and perceived efficacy. As in the ANOVA procedure, no significant interaction effects were found for threat and type of test, $\underline{z} = 1.045$, $\underline{p} = .296$, OR = 1.49.

Perceived threat was substituted for the manipulated threat variable and the logistic regression analysis was performed again because it is the perception of threat and not the fear manipulation that theoretically drives an individual to process the threat/hazard component of EPPM. Nonsignificant demographic variables of age, gender, and race were dropped from this analysis and an interaction term for perceived threat by type of test was created. Results from this analysis indicated that three variables were significant predictors of intent to undergo diagnostic testing: type of test, education level, and perceived treatment efficacy. The type of test (genetic or traditional) was the most important predictor of intent, $\underline{z} = 2.058$, $\underline{p} = .040$, OR = 9.80, with subjects in the traditional testing condition being nearly ten times more likely to submit to testing than subjects in the genetic testing condition. Education also played a significant role in intention, $\underline{z} = 3.036$, $\underline{p} = .002$, OR = 1.31, with the odds of a subject undergoing testing

increasing by just over one-third for each increase in education level. Education, efficacy, and type of test remain significant when manipulated threat was entered into the model, however type of test became nonsignificant when the threat by type of test interaction was entered.

Lastly, subjects were significantly more likely to submit to testing, as their perception of treatment efficacy increased, $z = 2.260$, $p = .024$, OR = 2.51. As with manipulated threat, no significant interaction effect between type of test and perceived threat was found, $z = 0.010$, $p = .992$, OR = 1.00.

Finally, it was decided to test whether education was acting as a possible moderating variable for the perceived threat by type interaction. People with more education may have reacted to the threat of MTS differently and possessed more information about genetic testing which in turn may have influenced their decision to undergo testing. Therefore a 3-way interaction variable consisting of perceived threat, type of test, and education level was added into the previous model; however, the results of this interaction proved nonsignificant, $z = 0.722$, $p = .470$, OR = 1.01.

While the logistic regression analysis also failed to confirm the predicted interaction in H3, other factors were found to play an important role in a subject's intent to undergo testing, specifically education and the perception of treatment efficacy. The fact that subject intent to undergo testing increased as perception of treatment efficacy increased lends further support for the findings in H2a and H2b.

CHAPTER IV

DISCUSSION

This study examined whether the same persuasion techniques used to convince people to submit to more traditional forms of diagnostic testing would be effective in persuading individuals to undergo genetically-based diagnostic testing. Specifically this study investigated whether the type of test advocated, the level of threat utilized in a message, and the temporal proximity of treatment to the diagnosis influenced the perceived efficacy of a recommended treatment and the intentions of subjects to undergo diagnostic testing. It was assumed that because of differences associated with genetic testing, namely a long lag-time between diagnosis and treatment, that techniques used to persuade individuals to undergo traditional diagnostic testing may not be as effective when trying to persuade people to submit to genetic testing. A model of fear appeals, EPPM, was chosen to test this assumption because of the utilization of fear appeals in prior health related research and campaigns (Dillard, Plotnick, et al., 1996; Klohn & Rogers, 1991; Maddux & Rogers, 1983; Witte, 1994, 1996; Witte, et al., 1998). The following discussion will briefly review the results of this study, as well as the theoretical and practical implications of the results. In addition the limitations of this particular study will be outlined and discussed.

According to EPPM, if subjects believed that the threat/hazard (severity and susceptibility) of MTS was high enough and the perceived efficacy (response and self) of the recommended response was low they should have utilized more maladaptive or fear

control strategies (e.g., source and message derogation, rejection of the suggested action) in order to reduce the fear they were experiencing. However, if the suggested response to MTS was perceived to be highly efficacious subjects should have employed more adaptive or danger control strategies to control the threat itself, even if the perception of the threat was still high.

The results of this effort indicate that the type of test recommended does have an impact on how subjects perceive the treatments associated with those tests and whether subjects wish to undergo the diagnostic testing. Specifically, treatments associated with genetic testing seem to lack the perceived response efficacy necessary to persuade someone to undergo this type of testing. Additionally, people were less likely to submit to testing when they perceived the response (testing) to be ineffective in combating the threat. Based on the results of this study, until more efficacious treatment options are developed for genetically-based diseases, utilizing fear inducing messages may not be the most viable method of persuading individuals to submit to this type of testing.

Traditional v. Genetic Testing

The threat/hazard component is the first aspect of EPPM that individuals must assess when presented with a message concerning their risk of having or contracting a disease. The threat must be of sufficient strength as to make people think it is serious and severe, and that they are susceptible to the threat, but not so great as to overshadow the efficacy of the response. Again, according to EPPM, if the threat is high and the perception of efficacy is low, individuals will resort to maladaptive/fear control strategies to assuage their fear but will do nothing about the actual threat.

This hypothesis received support with subjects in the high threat genetic condition utilizing more maladaptive strategies, which took the form of derogating the diagnostic test, than subjects in the high threat traditional condition. According to EPPM (Witte, 1994), this derogation of the advocated behavior by subjects in the genetic condition most resembles a maladaptive or fear control strategy. Tests of the threat manipulation indicated that subjects in both high threat conditions (traditional and genetic) felt threatened and fearful about MTS; however, there were significant differences in how they reacted to that threat. Instead of trying to control the threat of MTS, subjects in the genetic testing condition tried to control their fear by derogating the advocated behavior. They did not employ message or source derogation techniques and counter-argue that MTS was not a threat to be taken seriously, or that their physician was not credible. Rather, they indicated that they would rather be ignorant of their risk of developing MTS because the knowledge gleaned from the genetic test would be of little immediate value.

Previous research (Witte, 1992; Witte et al., 1998) found that message and source derogation were cogent examples of maladaptive strategies whereby subjects palliate their own fear by disparaging the source of the message or the message itself. Subjects refused to follow the advocated behavior by arguing that the message is in some way flawed or that the source is not credible or trustworthy. However, in the present study, no significant differences were found for source or message derogation. Subjects in both high threat conditions (traditional and genetic) felt that the message they received provided important information about a serious disease and did not feel the information was exaggerated, distorted, or boring. In addition, subjects in both conditions indicated

that if given information about MTS by their physician, they would feel neither exploited nor manipulated by their physician.

The lack of message derogation may be due to the fact that the messages in each scenario were believable, realistic, and contained some level of threat, even though the disease was purely fictitious. The lack of source derogation is probably related to the credibility afforded physicians in our society. People trust physicians, especially their own, and understand that a physician will not suggest you do anything that will cause you harm or put you at greater risk. Therefore, since the message about MTS was realistic and because people trust their physicians not to deceive or manipulate them, derogating the source of the message (physician) or the message itself did not seem appropriate for the subjects in this study in order to control their fear about MTS. Rather, they simply derogated the idea of undergoing the test by indicating they thought the test to be non-beneficial and a waste of time. It is possible that more source or message derogation may have been encountered if the experimental messages had employed different sources (e.g., lab technicians or family friends) or used even more intense language in explaining the symptoms of MTS and the prognosis for those diagnosed with this disease.

Threat or danger is an inherent part of any diagnostic process as there is risk, even in traditional testing, that people will be told that disease is present or developing. However, if individuals do not believe that genetically-based diagnostic tests will furnish them with important information, it will be very difficult, if not impossible, for them to utilize danger control strategies. They may perceive and attend to the threat and even feel fearful. However, if the suggested action (genetic test) does not lead to an efficacious

response (treatment), individuals will simply try to control their fear while doing nothing about the actual threat/hazard. Increasing the threat will only result in increased fear and a reappraisal of the threat and efficacy components, which in turn will lead to more maladaptive responses as the subject will reconfirm that the test and or treatment is deficient in response efficacy.

This problem really does not lie in the utilization of fear appeal techniques, which have been used with success for years in advocating healthy behaviors, but rather in the nature of genetic testing. The majority of genetic tests offer no absolute proof that one will develop a specific disease or condition, only an estimate of future risk. Therefore, an individual may be asymptomatic for years or even decades before the mutation expresses itself and symptoms appear. Moreover, since treatments for most diseases begin only after the appearance of symptoms, these individuals must wait for treatment as well as the disease. On the other hand, in more traditional testing situations the symptoms, act as a catalyst for conducting the diagnostic test and treatments begin as soon as the results are known. The major difference between these two models lies in the lag-time between the diagnosis and treatment, and this is the crux of the problem in trying to persuade individuals to undergo genetic testing.

Response Efficacy

The second component of EPPM is the efficacy component which is comprised of self and response efficacy. According to the model, if the threat/hazard component is of sufficient strength and the advocated behavior is seen as efficacious, the individual will employ adaptive (danger control) strategies and takes steps towards eliminating the

threat. However, if the efficacy of the advocated behavior is perceived to be low or wanting, the individual will employ maladaptive (fear control) strategies to control the fear but not the overall threat.

Support for this assumption of EPPM was found in H2a and H2b, and suggests that subjects in this study were much more interested in diagnostic testing when treatments were temporally proximal to testing than when the treatments were temporally distal. Results from the analysis of H2a indicated that subjects who received proximal treatment messages believed that the treatment described would be more efficacious, successful, and beneficial than subjects who received distal treatment messages. Additionally, subjects in the proximal conditions were very interested in starting the treatment as soon as the diagnostic testing was complete. Essentially, subjects were interested in treatments for MTS only if the treatment was available shortly after the diagnostic testing.

This preference for proximal treatment options was found regardless of the type of diagnostic test advocated. Subjects in the genetic condition who received a proximal message indicated as much preference for proximal treatments as subjects in the traditional condition. Likewise, subjects in the traditional condition who received a distal message were as unfavorable towards the treatment as subjects in the genetic testing condition. The fact that subjects preferred proximal treatment options was further supported when examining subjects' attitudes towards treatments from the first and second messages. Subjects who received a first message about a distal treatment (Part A) followed by the proximal second message (Part B) rated the proximal treatment option as

significantly more beneficial than the distal option. Subjects who received two proximal messages indicated no differences in their evaluations of the treatment alternatives.

The second part of this hypothesis (H2b) found that subjects' intent to undergo diagnostic testing was greatest when the treatment option was proximally related to the test regardless of the type of test advocated. Subjects in the genetic condition were just as likely to express interest in being tested as subjects in the traditional condition as long as the treatment options were proximally associated with the test. Once again, additional support for this finding was found when examining differences between the first and second message regarding subjects' intentions to undergo testing. Subjects who were reluctant to undergo testing after receiving a distal first message reversed their decision when informed about a proximal treatment in the second message.

The results of hypothesis 2a and 2b obviously attest to the preference for medical treatments that begin shortly after diagnosis. This is no real surprise as most people are accustomed to receiving treatment for a disease or condition shortly after being diagnosed. Given the fact that distal treatments were rated as less potentially successful, less efficacious, and less beneficial than proximal tests, and that subjects were less inclined to undergo testing when offered distal treatments, it appears that genetic testing lacks a strong semblance of response efficacy. Therefore, according to EPPM, trying to persuade people to undergo genetic testing by utilizing a high threat message may be quite ineffective and possibly harmful. For example, using a high threat message to persuade a woman with a familial history of breast cancer to undergo genetic testing may increase her fear of the disease but it may also point out the fact that there are few, if any,

efficacious preventative treatments for the disease. This in turn may lead the woman to believe that nothing can be done to prevent her from developing breast cancer and that procedures such as mammograms and self-exams are only delaying the inevitable. Even if an individual is convinced that a threat/hazard exists, the lack of an efficacious treatment (response efficacy) presents a formidable barrier to the utilization of danger control strategies.

Threat by Type of Test

No support was found for the hypothesized interaction between type of test and level of manipulated or perceived threat. It was assumed that subjects in the high threat traditional condition would be most likely to undergo testing, while subjects in the high threat genetic condition would be least likely to submit to testing. The results revealed that subjects in the low threat genetic condition were the least likely to be tested with high threat genetic subjects a close second. Subjects in the high and low threat traditional conditions were equal in their intent to be tested and were more likely to be tested than subjects in either genetic condition. This last result is similar to the results from the first hypothesis in which subjects in the traditional condition rated the diagnostic testing as more beneficial and less a waste of time than did subjects in the genetic condition.

Logistic regression analyses were conducted in order to double check the results of the analysis of variance tests as well as to investigate which variables played key roles in a subjects' decision to undergo diagnostic testing. As reported above, three variables were found to influence an individual's decision to submit to diagnostic testing: type of test, education level, and the subject's perceived efficacy of the treatment. The type of

test offered was the most influential variable. Subjects were nearly ten times more likely to undergo a traditional diagnostic test than a genetic diagnostic test, regardless of their perception of threat. Education level and perceived treatment efficacy also influenced intent to be tested but to a lesser degree than the type of test.

Theoretical Implications

While this study did not find support for every hypothesis, the results do suggest that messages employing fear appeals, specifically as they are understood in Witte's Extended Parallel Processing Model (1992, 1996), may not function in the same manner when dealing with genetically-based diagnostic testing. This is not to say that the model did not function in this study exactly as predicted (Witte, 1992, 1996); however, some peculiarities were found to exist in using messages to advocate genetic testing. In order to understand what happened with the messages associated with genetic testing each component of EPPM and how it functioned in this study will be discussed.

The manipulation check on threat and susceptibility in this study indicated that subjects who received a high threat message did perceive MTS to be a serious and severe disease and that they were susceptible to MTS while subjects in the low threat messages did not perceive MTS as severe or serious and did not see themselves as susceptible. Therefore, the threat presented in the high threat messages was of sufficient strength for subjects in the high threat condition to process the threat/hazard component of the model appropriately.

It is the efficacy component of EPPM that appears to be problematic when advocating genetically-based diagnostic testing. Subjects in traditional high threat conditions, who believed that MTS was a threat, recognized that the advocated diagnostic test would be in their own best interest and employed few maladaptive strategies in dealing with the threat. However, subjects in the genetic high threat condition chose to employ a maladaptive strategy and derogated the whole idea of genetic testing. In

addition, immediate treatment alternatives were perceived as far more efficacious than distal treatment options in this study. As genetically-based diseases are, for the most part, chronic diseases that progress very slowly over a number of years, immediate treatment is precluded and patients must watch and wait for symptoms to appear before treatments can begin. Trying to treat asymptomatic people for a disease they may or may not develop in the future is simply impractical. In this study, genetic tests, because of the lag-time between diagnosis and treatment, were perceived as having very little efficacy in dealing with MTS. Furthermore, because of the lack of perceived efficacy subjects were significantly less likely to indicate any intent to undergo genetic testing.

This indicates that the EPPM model worked exactly as predicted. In fact, when the treatment was deemed to be highly efficacious (traditional condition) a low-threat message was all that was needed to motivate subjects to be tested. However, when the treatment was perceived as having little efficacy, subjects rejected the opportunity to be tested, regardless of the level of threat. Because genetic testing has a conspicuous lack of response efficacy due to the lag-time between diagnosis and treatment, it appears that messages advocating genetic testing do not fit neatly within the parameters of EPPM. As there is little response efficacy associated with most genetic tests at the present time, it is improbable that utilizing fear appeals will result in people employing adaptive (danger control) strategies.

Practical Implications

Medical science is just beginning to reveal the promise and problems of genetic testing in diagnosing and treating disease. On the one hand, it shows tremendous promise as a technique to predict a person's risk of disease years before any symptoms appear. This may lead to increased surveillance, earlier diagnosis, and a higher cure rate for the disease. On the other hand, the lack of immediate treatment options, the chance that information might be released to insurance companies, and the fact that patients may have to live for years with the knowledge that they will someday develop a disease is enough to deter many people from even considering genetic testing. If, as this study suggests, employing messages that highlight the risk of a disease with no immediate treatment options is ineffective in convincing someone to undergo genetic testing, what are the alternatives?

It is possible that other social influence techniques may be more effective when used in conjunction with genetic testing. For example, messages that point out the possible "other" benefit of genetic testing may be more effective than utilizing "self" benefit messages that explain how someone would personally benefit from being tested. The fear of developing the disease may still be present however the threat of disease will not be the motivating factor in encouraging an individual to undergo testing.

Another possible technique may be to frame the message in terms of the gains and losses as used in Prospect Theory (Tversky & Kahneman, 1992; Wroe, Salkovskis, & Rimes, 1998). Focusing on the gains of genetic testing rather than the potential losses may encourage more individuals to undergo testing. Gains can be framed in a variety of

ways and could include everything from increased knowledge of individual health and the health of one's children to the fact that testing is no more difficult than an ordinary blood test. Granted, these gains may not outweigh all of the potential problems but they may help to alleviate the fear of knowing one's risk status experienced by many genetic testing patients.

However, additional research is needed to better understand all the fears and concerns associated with genetic testing. Research is also needed to examine the attitudes of ordinary people who have no history of hereditary disease towards genetic testing. For the most part, only people at risk of developing specific diseases have been asked to provide their opinions about genetic testing. Little is known of what the average person thinks about genetic testing, even though companies like Myriad Genetic Laboratories wish to make genetic tests to detect mutations like BRCA1 commercially available (Cancer Weekly, 1996).

Additionally, more research on the perceived efficacy of genetic testing is imperative to fully understand how people will react to future messages concerning genetic testing. Finally, it should be remembered that this is only a first step in understanding the relationship between fear appeals and genetic testing. More research is needed using different types of disease scenarios and more variations in the level of threat and efficacy. It may be possible to elicit increased motivation to undergo testing for diseases that are more familiar to people (e.g., breast cancer). Moreover, a more in-depth explanation of the treatment alternatives may increase perceived efficacy and lead to greater intent to be tested.

Limitations

First and foremost, this study was limited in the level of threat and fear it could realistically create in subjects. By no means was the level of fear and anxiety about MTS created in the subjects for this study equivalent to the genuine anxiety felt by a person who must decide to undergo genetic testing for an actual hereditary disease. This is clearly evident in the fact, that while the manipulation check for fear indicated a significant difference between subjects in high threat and low threat conditions, the effect size for this difference was quite small (η^2 =. 019). Nevertheless, it is the perception of severity and susceptibility that drives one to examine the efficacy components of EPPM and not actual fear, which plays only an indirect role. The difference found in perceived threat between high threat and low threat conditions resulted in a very reasonable effect size (η^2 = .302). So, while the actual fear created in subjects was not very notable, the severity and susceptibility component was sufficient to motivate subjects to examine the efficacy components of the model.

Secondly, this study was constrained by the amount of information and time provided to the subjects before they indicated their intentions to undergo testing. Subjects in this study were provided with two short messages concerning MTS, traditional and genetic testing, and the treatment options available. In reality, a person considering genetic testing would meet with a genetic counselor and be provided with a copious amount of information regarding their particular disease, genetic testing, and the treatment options available. Furthermore, the majority of subjects in this study completed the survey in 15-20 minutes, whereas individuals contemplating actual genetic

testing would be given several days or weeks to carefully consider all of their options. Therefore, these results should not be viewed as being characteristic of individuals who must actually consider submitting to diagnostic testing, genetic or traditional.

Finally, this study employed a fictitious disease (MTS) rather than an actual disease or condition familiar to the subjects. It is possible that because subjects had never heard of Mitchell-Thomas Syndrome prior to reading the study message they did not perceive MTS as a real and present threat. Using a more familiar disease, such as breast cancer, may have allowed the subjects to better understand their options concerning testing and treatment. In addition, the results of this study on MTS cannot be generalized to the diagnostic tests used to test for other specific diseases. Individuals will perceive the threat and efficacy of a disease based on what they know about the disease and what their physician tells them. However, a life threatening disease will remain life threatening regardless of the information the patient receives. Furthermore, treatments are not foolproof and do not work the same for every individual. Therefore, while the results of this study can inform one about certain perceptions regarding genetic testing, these perceptions are general and have little predictive power when examining specific non-fictitious diseases

Conclusion

The true impact of genetic testing has yet to be felt by physicians, patients, and the larger medical community. It is still too early to know if genetic testing is, as the title of Kennedy (1998) implies, a "Harbinger of hope or a landmine in the medical landscape" (p.30). One thing is clear though, genetic testing is not what most people have come to expect from diagnostic testing. In some ways, the problems associated with advocating genetic testing are similar to the very diseases exposed by genetic testing in that they are hidden, potentially serious, and difficult to treat when revealed. However, if genetic testing is to be the "harbinger of hope" research must continue to investigate the most effective techniques for communicating the promise and problems of genetic testing to those who will benefit the most from its application. As Freedman (1997) states:

> It is likely that "predictive" presymptomatic testing for diseases that might manifest themselves later in life will be commonplace. However, with the sequencing of BRCA1 and BRCA2, it has been demonstrated that the rapid diffusion of technology into the public marketplace has occurred far in advance of an in-depth consideration of the meaning of such knowledge to individuals, families, and the larger society (p.2063).

APPENDIX A

INITIAL EXPERIMENTAL MESSAGES

Traditional/High Threat/Proximal

Part A

Please read the scenario below and answer the questions on the following pages. If you have any questions please ask the researcher.

Imagine that you are not feeling well, you feel tired and fatigued as well as having the whites of your eyes look a little yellow. This lasts for about a week and you decide to go see your doctor to find out what is wrong. After a thorough examination your physician tells you, "You may have a newly discovered disease called Mitchell-Thomas Syndrome (MTS)." Your doctor then tells you that, "This disease usually strikes people in their late 50's to early 70's but can develop in people as young as 18 years old."

In addition, your physician tells you "Mitchell-Thomas Syndrome is a degenerative disease of the liver and kidneys that can kill if left untreated. It attacks people by making it very difficult for the body to clean the blood and evacuate different toxins from the body. This leads to a build up of these toxins in the liver as well as to the kidneys eventually shutting down. The symptoms that you are experiencing now, fatigue and yellowish eyes, are often seen in the initial stages of Mitchell-Thomas Syndrome."

Your doctor also tells you, "While 1 in every 500 adults are at risk of developing Mitchell-Thomas Syndrome, recent advances in medical testing have made it possible to diagnose this disease at a very early stage." Your physician explains that, "One simple blood test can tell us if you have MTS as well as informing you about the present condition of your kidneys and liver." Your doctor also explains that, "There is a new treatment available that can be started immediately after we know for sure that you have MTS, and most people who receive this new treatment suffer no side effects or recurrence of the syndrome."

Lastly, your doctor asks "So, do you want me to go ahead and order the blood test?"

Traditional/Low Threat/Proximal

Part A

Please read the scenario below and answer the questions on the following pages. If you have any questions please ask the researcher.

Imagine that you are not feeling well, you feel tired and fatigued as well as having the whites of your eyes look a little yellow. This lasts for about a week and you decide to go see your doctor to find out what is wrong. After a thorough examination your physician tells you, "You may have a newly discovered disease called Mitchell-Thomas Syndrome (MTS)." Your physician then tells you, "This disease usually strikes people in their late 50's to early 70's but can develop in people as young as 18 years old."

In addition, your physician tells you "Mitchell-Thomas Syndrome is a degenerative disease of the liver and kidneys that usually does no more than make you feel fatigued and in some cases anemic. It effects people by making it a little more difficult for the body to clean the blood and evacuate different toxins from the body. This leads to a slight build up of these toxins in the liver as well as the kidneys. The symptoms that you are experiencing now, fatigue and yellowish eyes, are often seen in the initial stages of Mitchell-Thomas Syndrome, but generally do not progress into anything more severe."

Your doctor also tells you, "While only 1 in every 5,000 adults are at risk of developing Mitchell-Thomas Syndrome, recent advances in medical testing have made it possible to diagnose this disease at a very early stage." Your physician explains that, "One simple blood test can tell us if you have MTS as well as informing you about the present condition of your kidneys and liver." Your doctor also explains that, "There is a new treatment available that can be started immediately after we know for sure that you have MTS, and most people who receive this new treatment suffer no side effects or recurrence of the syndrome."

Lastly, your doctor asks "So, do you want me to go ahead and order the blood test?"

Traditional/High Threat/Distal

Part A

Please read the scenario below and answer the questions on the following pages. If you have any questions please ask the researcher.

Imagine that you are not feeling well, you feel tired and fatigued as well as having the whites of your eyes look a little yellow. This lasts for about a week and you decide to go see your doctor to find out what is wrong. After a thorough examination your physician tells you, "You may have a newly discovered disease called Mitchell-Thomas Syndrome (MTS)." Your physician then tells you, "This disease usually strikes people in their late 50's to early 70's but can develop in people as young as 18 years old."

In addition, your physician tells you "Mitchell-Thomas Syndrome is a degenerative disease of the liver and kidneys that can kill if left untreated. It attacks people by making it very difficult for the body to clean the blood and evacuate different toxins from the body. This leads to a build up of these toxins in the liver as well as to the kidneys eventually shutting down. The symptoms that you are experiencing now, fatigue and yellowish eyes, are often seen in the initial stages of Mitchell-Thomas Syndrome."

Your doctor also tells you, "While 1 in every 500 adults are at risk of developing Mitchell-Thomas Syndrome, recent advances in medical testing have made it possible to diagnose this disease at a very early stage." Your physician explains that, "One simple blood test can tell us if you have MTS as well as informing you about the present condition of your kidneys and liver." Your doctor also explains that, "There is a new treatment available for MTS, however it is only effective in the later stages of the disease. Most people who receive this treatment suffer no side effects or recurrence of the syndrome, but since you are probably in the earliest stages of MTS it may be years or even decades before you could use this treatment."

Lastly, your doctor asks "So, do you want me to go ahead and order the blood test?"

Traditional/Low Threat/Distal

Part A

Please read the scenario below and answer the questions on the following pages. If you have any questions please ask the researcher.

Imagine that you are not feeling well, you feel tired and fatigued as well as having the whites of your eyes look a little yellow. This lasts for about a week and you decide to go see your doctor to find out what is wrong. After a thorough examination your physician tells you, "You may have a newly discovered disease called Mitchell-Thomas Syndrome (MTS)." Your physician then tells you, "This disease usually strikes people in their late 50's to early 70's but can develop in people as young as 18 years old."

In addition, your physician tells you "Mitchell-Thomas Syndrome is a degenerative disease of the liver and kidneys that usually does no more than make you feel fatigued and in some cases anemic. It effects people by making it a little more difficult for the body to clean the blood and evacuate different toxins from the body. This leads to a slight build up of these toxins in the liver as well as the kidneys. The symptoms that you are experiencing now, fatigue and yellowish eyes, are often seen in the initial stages of Mitchell-Thomas Syndrome, but generally do not progress into anything more severe."

Your doctor also tells you, "While only 1 in every 5,000 adults are at risk of developing Mitchell-Thomas Syndrome, recent advances in medical testing have made it possible to diagnose this disease at a very early stage." Your physician explains that, "One simple blood test can tell us if you have MTS as well as informing you about the present condition of your kidneys and liver." Your doctor also explains that, "There is a new treatment available for MTS, however it is only effective in the later stages of the disease. Most people who receive this new treatment suffer no side effects or recurrence of the syndrome, but since you are probably in the earliest stages of MTS it may be years or even decades before you could use this treatment."

Lastly, your doctor asks "So, do you want me to go ahead and order the blood test?"

Genetic/High Threat/Proximal

Part A

Please read the scenario below and answer the questions on the following pages. If you have any questions please ask the researcher.

Imagine that it is time for your annual physical, you feel fine but just to be on the safe side you schedule an appointment with your physician. After a thorough examination your physician tells you, "You may be at risk for a newly discovered disease called Mitchell-Thomas Syndrome (MTS)." Your physician then tells you "This disease usually strikes people in their late 50's to early 70's but can develop in people as young as 18 years old."

In addition, your physician tells you "Mitchell-Thomas Syndrome is a degenerative disease of the liver and kidneys that can kill if left untreated. It attacks people by making it very difficult for the body to clean the blood and evacuate different toxins from the body. This leads to a build up of these toxins in the liver as well as to the kidneys eventually shutting down. Symptoms like fatigue and yellowish eyes are often seen in the initial stages of Mitchell-Thomas Syndrome."

Your doctor also tells you, "While 1 in every 500 adults are at risk of developing Mitchell-Thomas Syndrome, recent advances in genetic testing have made it possible to discover if a person carries the gene that produces this disease." You are also told "Carriers of this gene have an 80% chance of developing Mitchell-Thomas Syndrome by the time they are 70 years old." Your doctor explains, "The genetic test is similar to a simple blood test, but we can discover if you will likely develop Mitchell-Thomas disease in your lifetime. Also, there is a new treatment available that can be started immediately after we know for sure that you have MTS, and most people who receive this new treatment suffer no side effects or recurrence of the syndrome."

Lastly, your doctor asks "So, do you want me to go ahead and order the test?"

Genetic/Low Threat/Proximal

Part A

Please read the scenario below and answer the questions on the following pages. If you have any questions please ask the researcher.

Imagine that it is time for your annual physical, you feel fine but just to be on the safe side you schedule an appointment with your physician. After a thorough examination your physician tells you, "You may be at risk for a newly discovered disease called Mitchell-Thomas Syndrome (MTS)." Your physician then tells you "This disease usually strikes people in their late 50's to early 70's but can develop in people as young as 18 years old."

In addition, your physician tells you "Mitchell-Thomas Syndrome is a degenerative disease of the liver and kidneys that usually does no more than make you feel fatigued and in some cases anemic. It effects people by making it a little more difficult for the body to clean the blood and evacuate different toxins from the body. This leads to a slight build up of these toxins in the liver as well as the kidneys. Symptoms like fatigue and yellowish eyes are often seen in the initial stages of Mitchell-Thomas Syndrome, but generally do not progress into anything more severe."

Your doctor also tells you, "While only 1 in every 5,000 adults are at risk of developing Mitchell-Thomas Syndrome, recent advances in genetic testing have made it possible to discover if a person carries the gene that produces this disease." You are also told, "Carriers of this gene have an 80% chance of developing Mitchell-Thomas Syndrome by the time they are 70 years old." Your doctor explains, "The genetic test is similar to a simple blood test, but we can discover if you will likely develop Mitchell-Thomas disease in your lifetime. Also, there is a new treatment available that can be started immediately after we know for sure that you have MTS, and most people who receive this new treatment suffer no side effects or recurrence of the syndrome."

Lastly, your doctor says "So, do you want me to go ahead and order the test?"

Genetic/High Threat/Distal

Part A

Please read the scenario below and answer the questions on the following pages. If you have any questions please ask the researcher.

Imagine that it is time for your annual physical, you feel fine but just to be on the safe side you schedule an appointment with your physician. After a thorough examination your physician tells you that, "You may be at risk for a newly discovered disease called Mitchell-Thomas Syndrome (MTS)." Your physician then tells you "This disease usually strikes people in their late 50's to early 70's but can develop in people as young as 18 years old."

In addition, your physician tells you "Mitchell-Thomas Syndrome is a degenerative disease of the liver and kidneys that can kill if left untreated. It attacks people by making it very difficult for the body to clean the blood and evacuate different toxins from the body. This leads to a build up of these toxins in the liver as well as to the kidneys eventually shutting down. Symptoms like fatigue and yellowish eyes are often seen in the initial stages of Mitchell-Thomas Syndrome."

Your doctor also tells you, "While 1 in every 500 adults are at risk of developing Mitchell-Thomas Syndrome, recent advances in genetic testing have made it possible to discover if a person carries the gene that produces this disease." You are also told, "Carriers of this gene have an 80% chance of developing Mitchell-Thomas Syndrome by the time they are 70 years old." Your doctor explains, "The genetic test is similar to a simple blood test, but we can discover if you will likely develop Mitchell-Thomas disease in your lifetime. Also, there is a new treatment available for MTS, however it is only effective in the later stages of the disease. Most people who receive this new treatment suffer no side effects or recurrence of the syndrome, but it may be years or even decades before you could use this treatment."

Lastly, your doctor says "So, do you want me to go ahead and order the test?"

Genetic/Low Threat/Distal

Part A

Please read the scenario below and answer the questions on the following pages. If you have any questions please ask the researcher.

Imagine that it is time for your annual physical, you feel fine but just to be on the safe side you schedule an appointment with your physician. After a thorough examination your physician tells you that, "You may be at risk for a newly discovered disease called Mitchell-Thomas Syndrome (MTS)." Your physician then tells you "This disease usually strikes people in their late 50's to early 70's but can develop in people as young as 18 years old."

In addition, your physician tells you "Mitchell-Thomas Syndrome is a degenerative disease of the liver and kidneys that usually does no more than make you feel fatigued and in some cases anemic. It effects people by making it a little more difficult for the body to clean the blood and evacuate different toxins from the body. This leads to a slight build up of these toxins in the liver as well as the kidneys. Symptoms like fatigue and yellowish eyes are often seen in the initial stages of Mitchell-Thomas Syndrome, but generally do not progress into anything more severe."

Your doctor also tells you, While only 1 in every 5,000 adults are at risk of developing Mitchell-Thomas Syndrome, recent advances in genetic testing have made it possible to discover if a person carries the gene that produces this disease." You are also told, "Carriers of this gene have an 80% chance of developing Mitchell-Thomas Syndrome by the time they are 70 years old." Your doctor explains, "The genetic test is similar to a simple blood test, but we can discover if you will likely develop Mitchell-Thomas disease in your lifetime. Also, there is a new treatment available for MTS, however it is only effective in the later stages of the disease. Most people who receive this new treatment suffer no side effects or recurrence of the syndrome, but it may be years or even decades before you could use this treatment."

Lastly, your doctor says "So, do you want me to go ahead and order the test?"

APPENDIX B

SECOND EXPERIMENTAL MESSAGE

PART B

Now suppose that your physician called you a week or so after your visit and told you that the Food & Drug Administration had just approved a new treatment for MTS, and that this new treatment could begin immediately. Recent research indicates that this treatment may be just as effective as the treatment you already heard about, but you will be able to start the treatment now instead of waiting at all.

APPENDIX C

DESCRIPTION OF STUDY

Diagnostic Testing and Disease

This study is designed to examine people's attitudes related to diagnostic testing and disease. If you decide to participate in this study you will be asked to imagine that you are told by your physician that you are at risk of getting a specific disease, and then answer several questions about whether you would undergo diagnostic testing in such a situation. In addition, you will be asked to provide some basic demographic information (age, sex, and education level). Please understand that we have no prior knowledge about your current health status and that the answers you provide will be completely anonymous. You are in no way required to participate in this study, and it should take no more than 15 minutes to complete this questionnaire. You may quit at any time by simply returning the questionnaire.

This survey has been approved by the Human Subjects Committee at the University of Arizona.

If at any time you have any questions about this study or your participation please contact Joseph Grandpre at 626-2363 or 742-9477.

If you have any questions regarding your rights as a research subject, please call the Human Subjects Committee office at 626-6721.

APPENDIX D

QUESTIONNAIRE

Questionnaire

Please indicate how much you agree with the following statements concerning the message you just read by circling a number beside the question.

	Strongly Agree				Strongly Disagree
1. I believe that Mitchell-Thomas Syndrome (MTS) is a severe disease.	1	2	3	4	5
2. I believe that Mitchell-Thomas Syndrome (MTS) is a serious disease.	1	2	3	4	5
3. The message I read about Mitchell–Thomas Syndrome (MTS) made me feel frightened.	1	2	3	4	5
4. The message I read about Mitchell–Thomas Syndrome (MTS) made me feel nervous.	1	2	3	4	5
5. The message I read about Mitchell–Thomas Syndrome (MTS) made me feel tense.	1	2	3	4	5
6. The message I read about Mitchell–Thomas Syndrome (MTS) made me feel anxious.	1	2	3	4	5
7. I intend to undergo the diagnostic test to determine if I have MTS.	1	2	3	4	5
8. I will not submit being tested for MTS regardless of what my physician tells me.	1	2	3	4	5
9. There is little chance that I would ever develop MTS, so being tested would be a waste of time.	1	2	3	4	5
10. I believe that being tested for MTS would be beneficial for me.	1	2	3	4	5
11. I believe that the treatments for MTS described in the would be effective in treating this disease.	1	2	3	4	5
12. I believe that if I was found to have MTS that it could be successfully treated.	1	2	3	4	5
13. If I were found to have MTS I would want to start treatments as soon as possible.	1	2	3	4	5

	Strongly Agree				Strongly Disagree
14. The chances of getting MTS are just too small to be concerned about.	1	2	3	4	5
15. I think that the information about MTS in this message was probably exaggerated.	1	2	3	4	5
16. I think that the information about MTS in this message was probably distorted.	1	2	3	4	5
17. The information about MTS in this message was boring.	1	2	3	4	5
18. Receiving information like this from my physician makes me feel exploited.	1	2	3	4	5
19. Receiving this information from my physician makes me feel that she/he was deliberately trying to manipulate my feelings.	1	2	3	4	5
20. I try to avoid thinking about diseases I may or may not develop in the future.	1	2	3	4	5
21. There really is not anything I can do to prevent getting MTS anyway, so I might as well forget about it.	1	2	3	4	5
22. I believe that being tested is the first step I could take to prevent developing MTS.	1	2	3	4	5
23. I believe that the possible preventative treatments would be effective in treating MTS.	1	2	3	4	5
24. I plan on undergoing the testing described by my physician.	1	2	3	4	5
25. I would rely heavily on my physician's advice in deciding whether I should undergo testing or treatment for MTS.	1	2	3	4	5
26. I would rely heavily on advice from my family and friends in deciding whether I should undergo testing or treatment for MTS.	1	2	3	4	5

PART B

Now suppose that your physician called you a week or so after your visit and told you that the Food & Drug Administration had just approved a new treatment for MTS, and that this new treatment could begin immediately. Recent research indicates that this treatment may be just as effective as the treatment you already heard about, but you will be able to start the treatment now instead of waiting at all.

Given this new information please answer the following questions.

	Strongly Agree				Strongly Disagree
27. I would undergo the diagnostic test to determine if I have MTS, so I could use this new treatment.	1	2	3	4	5
28. I will not submit being tested for MTS regardless of what my physician tells me about a new treatment.	1	2	3	4	5
29. I believe that being tested for Mitchell-Thomas Syndrome would be beneficial for me.	1	2	3	4	5
30. I believe that this new treatment for Mitchell-Thomas Syndrome would be effective in treating this disease.	1	2	3	4	5
31. I believe that being tested is the first step I could take to prevent developing MTS.	1	2	3	4	5
32. If I were found to have MTS I would want to start treatments as soon as possible.	1	2	3	4	5

Please answer the following questions by checking the box next to your answer.

33. What is your gender? Female Male

34. What is your age? _____

35. How would you describe your ethnic background? (mark all that apply)

Hispanic African-American Asian Native American

Caucasian Other_____

36. What is your educational background?

Did not graduate high school

High school or GED

Trade school

1-2 years of college

Associates degree

Bachelors degree

Masters degree

Ph.D.

M.D.

APPENDIX E

DEBRIEFING FORM

DEBRIEFING

Thank you very much for your participation in this study on diagnostic testing. Now that you are done answering the questions in the survey there are a few things that you need to know. First and most importantly, the Mitchell-Thomas Syndrome (MTS) is a purely fictitious (imaginary) disease. It was made-up for this study so that both men and women felt that they were at risk for contracting the disease. Again, MTS is not real and poses no danger for you or your family.

This study was done to examine whether the type of messages used to inform you about a disease makes a difference in whether you chose to undergo a diagnostic test. There were 8 different messages you could have received in this study. Half of the messages told you that MTS was life threatening, and the other half said that MTS was not life threatening. There were also two different types of tests offered: One test would tell you if you had the fictitious MTS now, and the other would tell you if you had a strong possibility of getting it in the future. Also, half of the messages said that there was a treatment that could start right away, while the other messages mentioned a treatment that could only begin years from now. The second treatment message you got was just the opposite of the first treatment message you read.

Specifically, this study set out to examine whether these differences in the messages that contained fear appeals would be effective in persuading people to undergo genetic testing in order to determine whether they are at risk of contracting a particular disease. It is hoped that by examining these issues we can create more effective messages that will help patients and health care professionals use life-saving diagnostic tests appropriately. While you may have felt anxious when reading the story there is no reason that you should fear contracting MTS or stop seeing your physician on a regular basis. Again, if you have any questions regarding this study please contact Joe Grandpre at 742-9477.

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