

SEEKING FAMILY HEALTH INFORMATION:
A TEST OF THE REVISED THEORY OF MOTIVATED INFORMATION MANAGEMENT

by

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(Under the Direction of Vicki S. Freimuth)

ABSTRACT

This dissertation presents a revised version of the Theory of Motivated Information Management (Afifi and Weiner, 2004) and tests it in the context of family health history. A survey of engaged individuals was undertaken to understand how factors such as uncertainty, expectations for information search, efficacy and emotion influence decisions and strategies for obtaining family health histories. This study provided support for a revised Theory of Motivated Information Management model. Results showed anxiety mediated the relationship between uncertainty discrepancies and direct information seeking. Communication efficacy was also shown to act as a moderator of the relationship between anxiety and direct information. The study found that lower anxiety levels facilitated intention to directly seek information when communication efficacy was high. Additionally, it was shown that family health problems, illness, and death most often prompted conversations about family health history and that mothers are approached first for family health information.

INDEX WORDS: Theory of Motivated Information Management, Information seeking, Health communication, Family health history, Efficacy, Uncertainty, Uncertainty Management Theory, Anxiety

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CHAPTER 1

INTRODUCTION

Health information seeking entails the use of specific actions and/or strategies by individuals to acquire information (Lambert & Loiselle, 2007). While health and risk communication messages have the potential to mitigate losses that stem from a risk, there is much researchers do not understand about the degree to which individuals seek out and process information. This dissertation focuses on health information seeking in interpersonal channels, looking specifically at the Theory of Motivated Information Management (Afifi & Weiner, 2004). This theoretical framework can be used to understand how factors such as uncertainty, expectations for an information search, efficacy, and emotion influence decisions and strategies for obtaining health information. Because this theoretical framework is relatively new, the goal of this dissertation is to refine and test a revised version of the theory in the context of family health history. This project seeks to advance knowledge and theorizing in the area of health information seeking and to discover new information about the barriers and facilitators to communication of family health information.

Theories of Health Information Seeking

Several scholars have modeled or theorized about the process of obtaining health and risk information. Many of the early, and still important, perspectives on health information seeking originated in models of information seeking developed by those in information or library science, such as Wilson's (1999) Information Seeking Behavior Models or Miller's (1995) Monitor Blunter Hypothesis. Within the field of communication, the Health Information Acquisition

Model (Freimuth, Stein, & Kean, 1989) was one of the first formal models to describe the process people use to assess their information level, engage in information seeking and evaluate information. The Comprehensive Model of Information Seeking or CMIS (Johnson, 1997) described in more detail the antecedent factors that influence information seeking and, unlike the health information acquisition model, took into account the characteristics of information sources and how these characteristics might influence seeking actions. More recent models of health information seeking have focused on the way risk perceptions influence information seeking actions. Griffin, Dunwoody and Neuwirth (1999) proposed the Risk Information Seeking and Processing model that includes not only on antecedent factors (including risk perception) that influence seeking, but also on how individuals cognitively process information and use that information to guide health behaviors. The Risk Perception Attitude Framework (RPA) suggests that information seeking behaviors are based not only on risk perception, but also on feelings of self-efficacy (Turner, Rimal, Morrison, & Kim, 2006).

While these models have advanced theorizing and knowledge of health information seeking, health communication scholars have not reached consensus on one dominant model. These models are complex and lack parsimony, making them difficult to test. This is evident in the literature as many of the proposed information seeking models go untested or are tested only by the model's authors. Additionally, these models approach information seeking very broadly. In other words, they predict information seeking in channels ranging from interpersonal to mass media. While people often use a variety of channels to obtain information, more recent theorizing suggests that the channels are unique. Recently a number of theories and models have focused in information seeking in interpersonal channels, perhaps a result of research showing that friends, family, and health professionals are often primary sources of health information

(Cheong, 2007; Marshall, Smith, & McKeon, 1995; Talosig-Garcia & Davis, 2005; Viswanath et al., 2006).

Of these interpersonal health information seeking models, many have focused specifically on information seeking in doctor-patient or medical decision-making contexts. These models include the Information Adequacy and Uncertainty Reduction (Sheer & Cline, 1995), Model of Patient Information Seeking (Czaja, Manfredi, & Price, 2003), and the Longo Model of Health Information, Communication and Information Seeking of Patients and Consumers (Longo, 2005). Most recently, Afifi and Weiner (2004) proposed a Theory of Motivated Information Management (TMIM) that focused specifically on information seeking within interpersonal channels. The TMIM is focused on interpersonal information seeking, but is not limited to the doctor-patient context. The theory takes its cue from Subjective Expected Utility (SEU) models whereby under conditions of uncertainty people think of all possible information seeking actions, and their consequences, to make decisions and ultimately choose information seeking strategies that have the greatest expected worth (Fischhoff, Goitein, & Shapira, 1981).

The TMIM is a useful theory because of its applicability to a wide variety of interpersonal settings, not just the doctor-patient context. However, the theory has seen limited testing and has been shown to perform adequately at best. Thus, the goal of this dissertation is to refine and test the theory to improve its ability to predict information management.

The Theory of Motivated Information Management

The TMIM focuses on the antecedents of information management (similar to the Risk Information Seeking and Processing Model (Griffin et al., 1999) and is rooted in theories of uncertainty reduction (Berger & Calabrese, 1975) and uncertainty management (Babrow, 2001; Brashers, 2001). This three-phase theory proposes that a gap between desired and actual

uncertainty about an issue arouses anxiety that motivates individuals to assess the utility of interpersonal information-management strategies (Afifi & Weiner, 2004). Specifically, it is proposed that individuals will make outcome assessments (costs and benefits of an information search) and efficacy assessments (beliefs about one's ability to obtain the information to reduce anxiety) in deciding how to manage information. The TMIM has been tested only in three previous studies (Afifi, Dillow, & Morse, 2004; Afifi et al., 2006; Afifi & Weiner, 2006) and in the context of sexual health, organ donation, and information seeking in close relationships. While the model generally fits there is work yet to be done on the structure of the model, the role of emotion and issue importance, and the measurement of efficacy in the model.

Family Health History Context

This dissertation tests the Theory of Motivated Information Management in the context of family health history. This context is ideal for an examination of the TMIM as family health history information is primarily obtained via interpersonal channels. Family history is a “nonmodifiable disease factor that when present might influence the probability of a suspected diagnosis” (Yoon et al., 2002, p. 305). A detailed family history in graphic form is known as a pedigree and is often used in genetic medicine to examine risk and reveal family disease patterns (Beery & Shooner, 2004; Wolpert & Speer, 2005). The “family” in family history is generally defined as one's biological family. However, Kardia et al. (2003) make the point that because genes and environment interact, family history should take into account both biological relationships (e.g. genetically-related) and social relationships (e.g. adoptive parents, step or foster parents). Even if information about one's biological family history is missing, environmental and behavioral risk factors are still useful for screening.

A family history of disease is shown to be a risk factor for a wide variety of chronic conditions including heart disease, diabetes, and various types of cancers (Harrison et al., 2003; Kardia et al., 2003; Keku, Millikan, Martin, Rahrkra-Burris, & Sandler, 2003; Negri, Braga, La Vecchia, Granceschi, & Parazzini, 1997; Pharoah, Day, Duffy, Easton, & Ponder, 1997; Williams et al., 2001). These diseases are among the leading causes of death for Americans and arise from complex interactions among genes, environment, and behavior (Hanson, Novilla, Barnes, & Meacham, 2007). It is important to note, however, that few conditions are the result of a single gene (Hanson et al., 2007). Genetic variations generally do not cause disease, nor do people inherit disease per se. People inherit susceptibility factors to certain effects of environmental factors that may increase their risk for disease (Centers for Disease Control, 2000). Thus, a “family history of a disease reflects shared environmental and behavior risk factors and their interactions with genes” (Hariri et al., 2006, p. 102).

Advances in genomic medicine have made family health histories even more important for the prevention, diagnosis, and treatment of common disease (Guttmacher, Collins, & Carmona, 2004). However, many physicians do not take a family health history. Current estimates show that family history is gathered anywhere from 50-100% of the time (Acton et al., 2000; Bowen, Ludman, Press, Vu, & Burke, 2003; Murff, Byrne, & Syngal, 2004; Stefanek & Wilcox, 1991). Younger physicians more commonly obtain this information than older physicians, and it is gathered more often from new patients than established patients (Acheson, Wiesner, Zyzanski, Goodwin, & Strange, 2000). Family histories may also not be kept up to date because of a lack of time, staff, and language barriers with patients (Irwin et al., 2004). One study showed that only 52% of physicians updated family history annually or when a family member had cancer (Acton et al., 2000).

In public health, family histories can be used to assess disease risk and influence early detection and prevention (Yoon et al., 2004; Yoon, Scheuner, & Khoury, 2003; Yoon et al., 2002). Yoon et al. (2004) suggests that public health professionals focus on helping people collect their own family health history information to share with health providers and assist providers to interpret and apply the information. The federal government has created software and web-based tools that help families gather a health history including *Family Health Ware* (produced by the Centers for Disease Control) and *My Family Health Portrait* (produced by the Department of Health and Human Services). The Surgeon General also designated Thanksgiving Day as National Family History Day. The Utah State Department of Health conducted one of the most extensive family health history projects to identify families at high risk, collecting over 80,000 family trees from 1983-1999 (Utah Department of Health, 2004). Several university hospitals (Ohio State, Nebraska, Northwestern, Pittsburgh) have also developed family health history tools and interventions to assist in the collection of information and to assess risk.

The goal of these public health efforts is to raise awareness of risk based on family health history and to increase interpersonal communication about the topic. However, it is important to avoid making assumptions about the potential impact of family health history beyond assessing disease risk. In the context of genomics and chronic disease, there is much debate over when gene-disease association research will be ready for use as a tool in public health (McBride et al., 2008). McBride (2005) points out that public health researchers must become more involved in research now to “understand the practical and proximal benefits of genomics for chronic disease” (p. 1). In the meantime, family health history can be a useful tool for assessing personal risk (Khoury, 2003).

Family Health History and the Perception of Risk

The literature shows that knowledge of one's family health history can have both positive and negative effects on health behavior and the perception of risk. People aware of their family history do not always engage in early detection or screening practices (Griffith, McGuire, Royak-Schaler, Plowden, & Steinberger, 2008; West et al., 2003), nor engage in health protection behaviors. One study showed that a cancer diagnosis drove more women to engage in preventative behaviors than just a family history of breast cancer (Madlensky et al., 2005).

However, some research shows that knowledge of family health history can increase feelings of susceptibility. Hunt, Davison, Emslie and Ford (2000) found that people who report a family history of heart disease are more likely to view themselves as at risk. In fact, some may even overestimate their risk (Audrain-McGovern, Hughes, & Patterson, 2003; Croyle & Lerman, 1999). Having a family history of a disease and greater perceived risk for the disease was found for a variety of chronic conditions including colon cancer, heart disease, and diabetes (Frich, Ose, Malterud, & Fugelli, 2006; Montgomery, Erblich, DiLorenzo, & Bovbjerg, 2003). Research suggests these high risk perceptions may result from having knowledge of belonging to a high-risk group (because of family history) and having experienced a family member's disease at close range (Drossaert, Boer, & Seydel, 1996; Kenen, Ardern-Jones, & Eeles, 2003).

In some cases, the perception of risk can be motivating. Harrison et al.'s (2003) review of the literature on diabetes suggests that increasing the perception of risk based on family history results in some health protection behaviors. Women with a history of breast cancer have been shown to be more vigilant about their health and adhere to screening guidelines (Foster, Watson, Moynihan, Jones, & Eeles, 2002; Lerman et al., 1993). Some people with relatives affected by breast cancer even initiate mammography screening at a younger age (Petrisek, Campbell, &

Laliberte, 2000). Additionally, 39% of men also report making health behavior changes in response to a risk of prostate cancer based on family history alone (Cowan, Meiser, Giles, Lindeman, & Gaff, 2008).

Family Health History Knowledge

It is not uncommon for people to be unaware of a family history of a disease until they themselves have developed it (Weiner & Durrington, 2008) which may be due in part to a lack of knowledge, lack of clarity about causes of death, and lack of communication (Bowen, Bourcier, Press, Lewis, & Burke, 2004; Ford et al., 2002). Yoon and colleagues (2004) report that while 96.3% of people believe family history is important to their health, only 30% of people have actively collected information to develop a family history.

Even people who believe they have knowledge of their family health history, may not have accurate information. Accuracy typically decreases for second and third generations of family members and varies as a function of the type of disease (Kelly, Andrews, Case, Allard, & Johnson, 2007). Substance abuse disorders, cancer of the female pelvic organs and bladder cancer have all been associated with less valid reporting or have been undetected by family members (Vandeleur et al., 2008; Ziogas & Anton-Culver, 2003). Some believe accuracy is important for screening and prevention guidelines and that inaccurate information might result in the failure to identify people at high risk (Murff, Greevy, & Syngal, 2007). When accurate information is unavailable, counselors must provide advice based on assumptions rather than knowledge (Green, Richards, Murton, Statham, & Hallowell, 1997). Knowledge and accuracy of family history may be impacted by a concern or hesitation with reporting family history, a misunderstanding or lack of awareness of family history, an inability to research history and a prevalence of disease within the family (Kelly, Shedlosky-Shoemaker et al., 2007).

To fully utilize family health history as a tool for risk identification, it is essential people have complete and accurate family health histories. Yet, as research suggests, this may not be the norm. Therefore it is important to increase information seeking and communication about health history within the family to improve individual knowledge and accuracy. As Vogel et al. (2007) have suggested, “having a family history of a condition may pose a significant threat to the health of an individual, a threat that could be ignored” if he or she is unaware of this history (p. 356). Researchers must focus on the facilitators and barriers to communication about health history and messaging strategies to increase communication in families. Much of the research in this area has focused on family communication regarding genetic testing results and/or genetic counseling when anxiety and the potential risks are high. Additionally, much of it is exploratory and lacks a solid theoretical framework for understanding interpersonal communication among family members. Theory-based research is needed to better understand family communication of genetic issues. The TMIM provides an ideal framework for addressing these issues.

Study Overview

The primary goal of this dissertation is to refine and test the Theory of Motivated Information Management. Chapter 2 presents the TMIM and the major constructs that comprise the theory. The TMIM is also discussed in the context of family health history to show where gaps in our understanding exist. A set of hypotheses is presented in this chapter to test the revised TMIM model. Chapter 3 presents a two-phased approach for testing the model, including results from a pilot study on family health information seeking and methods for a larger quantitative study. Chapter 4 presents the results of the test of the TMIM and comparative test of the original TMIM. Finally, chapter 5 provides a discussion of the results, limitations, and plans for future research.

CHAPTER 2

THEORY AND CONTEXT

The theoretical framework examined in this study is the Theory of Motivated Information Management (TMIM; Afifi & Weiner, 2004). This relatively new theory of information seeking is limited to information seeking in interpersonal encounters and is rooted in theories of Uncertainty Reduction, Uncertainty Management, Problematic Integration Theory, Social Cognitive Theory and the Comprehensive Model of Information Seeking (Afifi, 2008). TMIM is relevant in situations where individuals are interested in managing information interpersonally and intentionally engaging cognitive resources to achieve this goal (Afifi & Weiner, 2004). The interactive and rich nature of interpersonal communication makes it unique from other information sources. The limited scope of the TMIM also allows researchers to better understand the process of information management via interpersonal exchanges, a process that may be missed in general models of information seeking (Afifi & Weiner, 2004).

The Theory of Motivated Information Management is an ideal theoretical framework for exploring communication about family health history as this information is obtained primarily through interpersonal channels. If uncertainty discrepancies about family health history *do* exist, the TMIM predicts whether direct information seeking is likely to occur. The model can also shed lights on how people's experience of anxiety, expectations for an information search, and their feelings of efficacy shape the information management decisions they make.

Model Overview

The TMIM (Figure 2.1) proposes a three-phase process of information management that individuals go through when deciding whether and how to gather information interpersonally (Afifi, 2008). The term information management is used over information seeking, so that the model can account for a broader array of information behaviors. These information management behaviors include information seeking (direct and indirect), information avoidance, and reappraisal of one's need for information. However, tests of the TMIM have focused primarily on the extent to which individuals seek information.

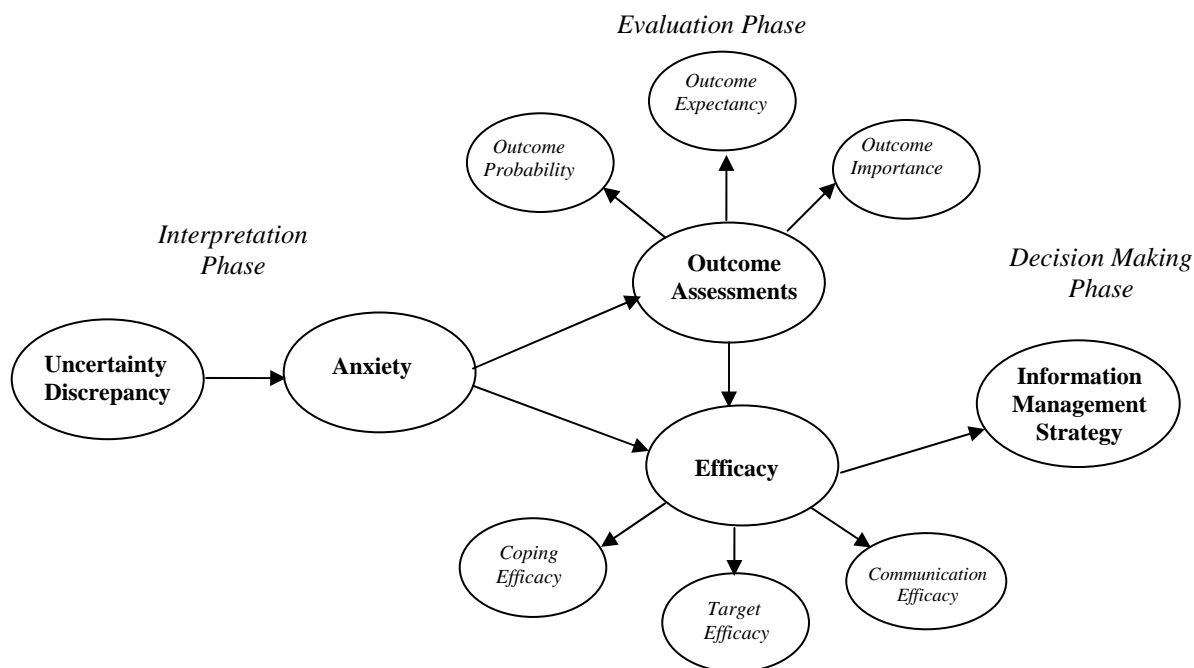


Figure 2.1 *The Theory of Motivated Information Management*

The model proposes that the process of information management begins when a gap or discrepancy exists between one's actual and desired level of uncertainty about an issue (phase one). Uncertainty discrepancy is proposed to arouse anxiety that motivates individuals to evaluate the utility of information-management strategies (phase two; Afifi & Weiner, 2004). In

deciding on an information strategy (phase three), individuals assess the outcomes they expect for an information search and how efficacious they feel. Each phase of the model, along with the important constructs and theoretical origins, are described in detail below.

Phase One: Interpretation

Phase one of the TMIM is labeled interpretation. The experience of uncertainty and the interpretation of uncertainty are the primary activities in this phase. Uncertainty is defined using Brashers (2001) definition that states that uncertainty occurs when details about a situation are “ambiguous, complex, unpredictable, or probabilistic,” when information is not available or inconsistent, or when people feel insecure about their own or a general state of knowledge (Afifi & Weiner, 2004, p. 478). The interpretation phase is “characterized by awareness of an uncertainty discrepancy about an important issue and the anxiety that ensues” (Afifi & Weiner, 2004, p. 171). The two critical constructs in this phase of the model are uncertainty discrepancy and anxiety.

Uncertainty discrepancy. An uncertainty discrepancy exists when the amount of uncertainty people have differs from the amount of uncertainty they want or desire. The greater this difference, the larger the discrepancy. The discrepancy concept is rooted in theories of Uncertainty Reduction (UCRT; Berger & Calabrese, 1975), Problematic Integration (PI; Babrow, 1992), and Uncertainty Management (UMT; Bradac, 2001; Brashers, 2001). All three theories share a common belief that uncertainty is a cognitive entity and are focused on understanding the role of communication in coping with uncertainty (Bradac, 2001), yet they differ in important ways.

In UCRT, uncertainty is the product of the computation of alternative explanations for future and past behaviors (i.e. the more alternatives, the more uncertainty). It is a state that is

always sought to be reduced and is unconnected to emotion (Bradac, 2001). In PI theory, uncertainty is described as a problematic integration between probability (beliefs or expectations) and evaluation (values or desires), and the conflict or tension that results from these integrations (Babrow, Hines, & Kasch, 2000; Bradac, 2001). In the UMT, uncertainty is viewed as both a positive and negative state. UMT suggests people may not always desire to reduce their uncertainty level and may view uncertainty as positive state, a tool, or a resource that allows them to maintain hope or optimism (Afifi & Weiner, 2004; Bradac, 2001; Brashers, 2001). As Brashers (2001) writes, "I may have a great deal of information about a topic, I may have an amount of information that other people would deem sufficient to make a decision or to predict another's behavior, and I may even have all the information that is currently available, yet I still may feel uncertain" (p. 478). The reverse can also be true whereby a person has no information, but feels very certain and does not desire to become more certain.

The major difference between UCRT and its successors (PI/UMT) is the belief that there are variations in the meanings or experience of uncertainty and the ways that uncertainty can be managed (Babrow, Kasch, & Ford, 1998). The TMIM aligns itself more closely with the later two theories. The uncertainty discrepancy in the TMIM reflects PI and UMT in that uncertainty is not always viewed as a negative state and that individuals may not always be driven to reduce the uncertainty. In the TMIM it is not simply uncertainty that causes anxiety, but an uncertainty discrepancy. For information discrepancies to exist an individual must desire more or less uncertainty than they have. In the context of family health history, the amount of uncertainty individuals have about their family history must differ from the amount that they desire. If an uncertainty discrepancy is present, anxiety will increase.

Anxiety. In the TMIM, *anxiety* is the result of an awareness “of an important issue for which [people] desire more or less uncertainty than they have” (Afifi & Weiner, 2004, p. 174). Rooted in theories of PI and UMT, the TMIM proposes anxiety exists only in situations where there is a disequilibrium of actual and desired uncertainty (Afifi, 2008). Thus, situations where individuals use uncertainty to maintain hope or optimism are not anxiety provoking. Anxiety is proposed to exist only when an uncertainty discrepancy is present and is viewed as a negative emotion that motivates individuals to seek information.

Anxiety is proposed to partially mediate the effects of an uncertainty discrepancy on the evaluation and decision phases of the model (Afifi & Weiner, 2004). It is a partial mediator (as opposed to a moderator) because it is expected that anxiety accounts for a substantial proportion (but not all) of the relationship between uncertainty discrepancy and information management (Kenny, 2008). A mediator variable *accounts for* the relationship between an independent and dependent variable while a moderator variable *affects* the direction or strength of the relationship (Baron & Kenney, 1986).

The decision to position anxiety as a partial mediator in the TMIM is rooted in activation theory. Activation theory suggests that anxiety can be thought of as a stress response or a general alarm system that reacts to the registration of discrepancies between set values (what is expected) and actual values (what is happening in reality) for the processes registered and controlled by the brain (Ursin & Eriksen, 2004). Because an uncertainty discrepancy is not what is expected, it is theorized to trigger anxiety that activates evaluation and decision-making about an information management strategy to reduce anxiety and uncertainty.

The inclusion of anxiety makes the TMIM an emotional and cognitive model. Related research in information processing shows that emotion does influence the way individuals

process messages. Specifically, emotions may act as heuristics or mental shortcuts that can minimize information processing, can stimulate careful or deep information processing, or can promote selective information seeking by framing or making more salient some pieces of information over others (Nabi, 2002). Emotions are defined as internal mental states that arise as a result of certain cognitions. They are valenced reactions to events, agents or objects that vary in intensity and lifespan (Ortony, Clore, Collins, 1988). While anxiety is considered an emotion, some have suggested anxiety has slightly different properties than other emotions. Whereas emotions (like fear) are related to a concrete and specific danger, Miceli and Castelfranchi (2005) define anxiety as an “uncertainty about some event or state which implies a possible danger” (p. 295). Furthermore, they suggest anxiety is motivating because people typically desire to predict and control anxiety. This definition of anxiety is consistent with the TMIM whereby anxiety results from uncertainty and stimulates information management.

It is important to note, however, that high levels of anxiety do not always trigger information seeking or other communicative behaviors. In the context of the TMIM, Afifi et al. (2004) found that people were more likely to gather information when anxiety was low rather than high. Other research supports this finding. Smith et al. (2006) found that willingness to communicate about organ donation was negatively related to the amount of anxiety they felt, while Millar and Millar (1996) found that low-anxiety persuasive messages produced more positive attitudes and intention to perform disease detection behaviors than did high-anxiety messages (the inverse was true for promotion behavior). Hale, Lemieux, and Mongeau (1995) found that people who received a low-fear message engaged in more message-relevant thinking than those who received a high-fear message. They also found that people who were high in trait anxiety engaged in less message-relevant thinking than people low in trait anxiety, suggesting

that people may process a message more deeply when they feel less anxious. Case, Andrews, Johnson and Allard (2005) suggest people may avoid information if it causes them stress or discomfort.

Additionally, the fact that the TMIM accounts *only* for anxiety resulting from an uncertainty discrepancy, may be a limiting factor of the model. The model does not recognize other sources of anxiety that may arise under conditions of uncertainty. In the case of family health history, an uncertainty discrepancy may also produce anxiety about what is contained in that family history or anxiety about talking to family members about health issues. While uncertainty discrepancy and anxiety are “most central to initiating the process of information management in interpersonal exchanges” (Afifi & Weiner, 2004, p. 174), the influence of anxiety or other emotions should be explored.

Phase Two: Evaluation

Phase two predicts that the anxiety produced by the uncertainty discrepancy will motivate individuals to evaluate their information-management options (Afifi & Weiner, 2004). Specifically, the TMIM postulates that anxiety will motivate individuals to make (a) outcome assessments (the costs and benefits of an information search) and (b) efficacy assessments (beliefs about one’s ability to obtain information and reduce anxiety) (Afifi, 2008; Afifi, Dillow, & Morse, 2004; Afifi & Weiner, 2004). As it is proposed, outcome and efficacy assessments mediate the relationship between anxiety and information management.

Outcome Assessments. Outcome assessments are one type of assessment made in the evaluation phase of the TMIM. The term outcome assessment refers to the evaluation of potential outcomes of actions prior to the decision to engage in these actions (Afifi and Weiner, 2004) and comes from expectancy-value models such as the Health Belief Model, Theory of

Reasoned Action, and Social Cognitive Theory. In the context of family health history, outcome assessments refer to one's assessment of whether communication with family members will yield the desired information. Expected outcomes are among the things people consider when choosing a course of action and, according to Response Expectancy Theory, people tend to experience the response that they expect (Kirsch, 1999). Thus, people who think information seeking about family health history will be difficult are more likely to find it difficult.

Afifi and Weiner (2004) propose individuals make three kinds of outcome assessments. This hypothesis is rooted primarily in the work of Kirsch (1999) and Maddux (1995). These three outcome assessments include (a) *outcome expectancies* (the costs/benefits associated the information search and result); (b) *outcome importance* (the importance of the outcome for self or relationship) and; (c) *outcome probability* (the likelihood that outcome expectancies will occur). Of these three outcome assessments it is argued that outcome expectancy is primary while outcome importance and outcome probability are peripheral (Afifi et al., 2004). However, it is not clear what roles outcome importance and outcome probability actually play in the TMIM model. While these three outcome assessments are proposed, outcome expectancy is the only one measured. The decision to look at outcome expectancies only may have to do with a lack of measures for outcome importance and probability. For the sake of simplicity, this study also assesses only outcome expectancies.

Efficacy. The concept of efficacy originates from Bandura's (1977) social cognitive theory and is a widely recognized variable in health behavior theories. Efficacy in the TMIM refers to one's confidence in their ability to obtain and manage information. Interestingly, the efficacy variable is nearly absent from theories of information behavior and studies of relational behavior (Afifi et al., 2004; Afifi & Weiner, 2004), with the exception of Freimuth et al. (1998).

Its inclusion in the TMIM makes the theory unique from other information seeking models. Afifi and Weiner (2004) propose three types of efficacy including (a) communication efficacy, (b) coping efficacy, and (c) target efficacy. Communication and coping efficacy are related to the concept of self-efficacy or how capable an individual feels performing a certain behavior (Bandura, 1977). Target efficacy is related to the concept of response efficacy or the perception of how effective a behavior will be. It is proposed that the three types of efficacy are components of a latent efficacy construct, contribute equally to one's evaluation of efficacy, and operate together to affect decision making about information strategies (Afifi & Weiner, 2004).

Communication efficacy is defined as an information manager's perception that he or she possesses the skills to successfully enact tasks involved in information-management (Afifi et al., 2006). In the context of family history, communication efficacy would refer to his/her ability to carry out an information strategy to get the health history information he or she desires. Coping efficacy refers to the extent that an individual believes he or she has the emotional, instrumental, and other resources to manage the process- and results-based outcomes expected from an information-management strategy under consideration (Afifi & Weiner, 2004, p. 178). Coping efficacy refers to the information manager's ability to cope with the information management process and the information they might receive as a result of information management. In the context of family health history, individuals must decide if they can cope with the process of information management and the information that might result.

The final type of efficacy in the TMIM, target efficacy, aligns closely with the concept of response efficacy which refers to individual beliefs or perceptions about the effectiveness of a response (Witte, 1992). Target Efficacy, as defined by Afifi and Weiner, refers to whether one is confident that an information target will be willing and able to provide desired information (Afifi

et al., 2006; Afifi & Weiner, 2004). Target efficacy is proposed to consist of two components including (a) target ability (whether the target has access to the information), and (b) honesty (confidence in the target's willingness to provide all information at his/her disposal) (Afifi et al., 2006). Thus, the TMIM suggests individuals are unlikely to seek information from targets if the targets are unable or unwilling to provide information (Afifi & Weiner, 2004). For example, individuals in families that communicate little about health or keep health information private may perceive difficulty in obtaining family health information they desire. The concept of target efficacy, while used little in health information seeking models, is not a new concept. The target efficacy construct is an important and strong predictor of behavior in both the Protection Motivation Theory (Floyd, Prentice-Dunn, & Rogers, 2000) and the Comprehensive Model of Information Seeking (Johnson, 1997).

In the TMIM, it is proposed that individuals make outcome assessments (measured by outcome expectancies) followed by efficacy evaluations. Thus, outcome expectancies are expected to be partially mediated by efficacy. While outcome expectancies may exert *some* direct influence on information management it is believed that outcome assessments influence efficacy assessments, which predict the selection of an information-management strategy. Furthermore, Afifi and Weiner (2004) suggest the strength of this mediating relationship depends on the valence of the expectancies. They hypothesize that individuals will place more weight on efficacy if they expect the outcomes of an information search to be negative and less weight on efficacy if the expected outcomes are positive.

Witte's Extended Parallel Process Model (EPPM) inspired the hypothesized relationships in Afifi and Weiner's (2004) model. According to Witte (1994), when individuals are faced with a fear appeal they will first gauge the threat (severity and susceptibility) and then appraise their

efficacy (self and response efficacy). The greater the threat, the more likely individuals are to appraise their efficacy to engage in the recommended response (Witte, 1994). A similar action is expected in the TMIM whereby individuals experiencing uncertainty discrepancies and anxiety are expected to assess information seeking outcomes and efficacy. The more positive the assessment, the theory suggests, the more likely individuals are to directly seek information. The more negative the assessment, the more likely individuals are to avoid information or cognitively reappraise.

Phase Three: Decision-Making

The final phase of the TMIM is the decision-making phase whereby individuals decide on information management strategies to reduce their uncertainty and anxiety. The model assumes that uncertainty discrepancies and anxiety motivate individuals to manage information. The TMIM proposes that assessments of outcomes and efficacy lead to decision-making whereby individuals choose one of three information management strategies (Afifi et al., 2006). It is hypothesized that individuals may choose to (1) seek relevant information, (2) avoid information, or (3) cognitively reappraise the situation. These are perceived to be separate categories of information seeking, as opposed to opposites along a continuum.

If individuals pick the first strategy, to *seek information*, it proposed that they will use one of Berger and Kellerman's (1994) three information acquisition strategies. These strategies include (1) active strategies (interrogating a target), (2) passive strategies (such as unobtrusively observing targeted information provider), or (3) interactive strategies (interacting with the target). These three strategies are further reduced into direct and indirect strategies in the TMIM. In the context of family health history, a direct approach would include asking a family member directly about family health history. An indirect approach would include listening for

information, hinting at a need for information (without coming out and asking), asking someone else to find out the information, or using non-interpersonal sources (e.g. death records or websites). If efficacy and outcome expectancies are high it is expected an individual will seek information. If information seeking is too costly, unlikely to reduce anxiety, or is expected to be unproductive, it is expected that individuals will not seek information and choose another information management strategy (Afifi & Weiner, 2004).

The second information strategy individuals may choose is *avoidance*. Individuals who avoid information choose to live with anxiety (a negatively-valenced emotion) and some degree of uncertainty. While this option may seem less attractive than information seeking, research shows it may not be uncommon. A meta-analysis examining the impact of mood on persuasion showed that people in negative moods do not preferentially attend to proattitudinal messages (Hullett, 2005). In other words, not everyone in negative mood wants to alleviate that negative state. Afifi and Weiner (2004) write that avoidance can be active or passive. Active avoidance is similar to Witte's (1998) concept of a maladaptive fear response whereby individuals will ignore or distort incoming information about a threat. Afifi and Weiner (2004) expect that people who perceive information seeking as risky will actively avoid information because reduction of uncertainty-related anxiety could be more damaging than beneficial. These individuals are choosing to "live with the uncertainty-related anxiety" (p. 183) rather than reduce it and potentially create more anxiety (Afifi & Weiner, 2004). People who are passive avoiders are expected to "let the issue unfold without perusing the environment or target for clues and take a lackadaisical or laissez-faire attitude about information" (Afifi & Weiner, 2004).

The third information management strategy is *cognitive reappraisal*, defined as diminishing anxiety by cognitively altering one's need to manage uncertainty (Afifi & Weiner,

2004). Afifi and Weiner (2004) suggest cognitive reappraisal is different from avoidance because the goal of reappraisal is to remove anxiety without gathering any information. The act of cognitive reappraisal means shifting the perception of issue importance, desired level of uncertainty, or meaning of certainty (Afifi & Weiner, 2004). It is important to note that while cognitive reappraisal is proposed, it has never been tested. Cognitive reappraisal is likely not assessed because of the difficulty in measurement. Cognitive processes, such as cognitive reappraisal, may largely be unconscious or automatic. Asking people to recall or to predict a cognitive behavior may not be feasible or reliable.

It is important to note that while Afifi and colleagues present information management as a set of “options” (Afifi et al., 2004), they are not entirely clear about whether individuals may use one strategy or multiple strategies. TMIM studies often measure only information seeking, and sometimes only direct information seeking (Afifi et al., 2006; Afifi & Weiner, 2006). The present study measures information seeking (both direct and indirect) and avoidance.

Tests of the TMIM

Because the TMIM is a relatively new theory, only three published pieces have tested the theory (Afifi et al., 2004; Afifi et al., 2006; Afifi & Weiner, 2006). Using structural equation modeling (SEM) to test the model, Afifi and colleagues have been able to determine if the model provides an adequate explanation for why variables are correlated and the degree to which the original correlations can be reproduced (which provides an indication of the fit of the model). Tests of the TMIM model have generally shown the model exhibits good fit to the data. However, the authors usually take a model-fitting approach (i.e. including and excluding various forms of efficacy) as opposed to testing the full model as it is hypothesized. Measurement

models examining the latent efficacy variable have also failed to show that communication, coping, and target efficacy form a single efficacy construct.

The first test of the TMIM was in the context of information seeking in close relationships (Afifi et al., 2004). Results of the study showed the model fit well, minus the coping efficacy and target ability variables. There were some surprises in terms of the direction of the parameters. Individuals were more likely to gather information when anxiety was low, suggesting that high levels of anxiety can prohibit information seeking. Results also showed that a decision to *avoid* information was driven by outcome expectations (which is inconsistent with the model predictions), whereas a decision to actively *seek* information was driven by efficacy and indirectly by outcome expectations (which is consistent with the model predictions). Afifi and Weiner (2004) suggest this difference is because people who avoid information do so because of their natural inclinations, regardless of their level of efficacy. The 2004 study also found issue importance to be a significant predictor of information search directness, anxiety, uncertainty discrepancy, and outcome expectancy.

The model was tested a second time in the context of sexual health (Afifi & Weiner, 2006). One notable difference in this study was the testing of three separate models, one for each type of efficacy. The model was tested this way because all three types of efficacy failed to form a single latent efficacy construct in tests of the measurement model (despite the fact that they used similar measures to those in the previous study). By testing a model for each type of efficacy the authors took an alternative models approach. Results showed that the model with target efficacy exhibited excellent fit compared to only a moderate fit with communication efficacy (Afifi & Weiner, 2006). The coping efficacy model was not significant. The paths in the target efficacy model were also significant, with the exception of those from outcome

expectancy. Thus, the model failed to provide support for the prediction that (a) outcome expectancy and efficacy mediate the influence of anxiety on information seeking and that (b) efficacy partially mediates the influence of outcome expectancy on information seeking.

The third and final test of the TMIM was in the context of organ donation (Afifi et al., 2006) The investigation consisted of two studies. The first surveyed participant's decisions to talk directly with family about organ donation. In this study, revisions (mostly linguistic) were made to the efficacy measures because Afifi and colleagues had not previously been able to verify a latent efficacy construct. The second study assessed actual interaction with family members about organ donation, looking specifically at information-seeking efforts.

Results of the first organ donation study showed efficacy could be treated as a latent variable comprised of communication and coping efficacy. Target efficacy failed to meet minimum reliability standards. The model fit was also consistent with the data and additional regression analyses showed that efficacy mediated the relationship between outcome expectancy and directness of talk (unlike the Afifi and Weiner (2006) sexual health study).

The second organ donation study (Afifi et al., 2006) required participants to come into the lab where they discussed a series of cards about organ donation and completed a post interaction questionnaire assessing outcome expectancy, communication efficacy, organ donor status, issue importance, attitudes towards organ donation, and information seeking. Target efficacy was also not examined in this study. Results showed that organ donation issue importance was associated with outcome expectancy and intention to talk to family members, illustrating again the importance of issue importance. The mediation predictions and the basic structure of the TMIM model were also supported. Results showed outcome expectancy was positively associated with communication efficacy (controlling for issue importance) and that

communication efficacy was positively associated with amount of information sought during the interaction.

Proposed Model Refinements

While these studies show partial support for the model (Afifi & Matsunaga, 2008) and provide important insight into the process of information management (Afifi & Weiner, 2006) they also illustrate the need for further theorizing and model refinement. In this dissertation several modifications to the model are proposed and tested. These modifications focus on the overall structure of the model, the inclusion of issue importance, additional sources of anxiety in the model, and efficacy measurement.

Model Structural Changes

The major proposed change to the TMIM has to do with the mediation predictions in the model (specifically that outcome expectancies and efficacy mediate the relationship between anxiety and information management). As shown previously, the research on whether outcome expectancies and efficacy assessments act as mediators is mixed. One test failed to provide support for the proposition that outcome expectancy and efficacy mediate the influence of uncertainty-discrepancy anxiety on information seeking (Afifi et al., 2004) while another showed that efficacy mediated the relationship between outcome expectancy and directness of talk (Afifi et al., 2006).

These mixed results suggest it may be worthwhile to look at alternative explanations for the role of outcome expectancies and efficacy in the model. One alternative to this prediction of outcomes and efficacy as mediators is to present them as moderators of the relationship between anxiety and information management. Presenting them as moderators may also be more consistent with the TMIM framework. As stated previously, a moderator variable is one that

affects the direction or strength of the relationship between an independent variable while a mediator variable *accounts* for the relationship between a independent and dependent variable (Baron & Kenney, 1986). Further, Baron and Kenney suggest moderators specify *when* certain effects will hold while mediators address *how* or *why* these events occur. Afifi and Weiner (2004) propose that anxiety triggers people to make assessments about their information management, but they also state that outcome assessments and efficacy “contribute to individuals’ information management decisions” (Afifi & Weiner, 2004, p. 175). The notion that they *contribute* as opposed to *account* for the relationship between anxiety and information management suggests a moderating effect.

Other models of information seeking support this moderation hypothesis. The Risk Perception Attitude (RPA) framework posits that anxiety interacts with efficacy to influence information seeking. In the RPA framework anxiety is shown to interact with efficacy to influence behaviors such as information seeking (Rimal & Real, 2003; Turner, Rimal, Morrison, & Kim, 2006). While this prediction has not received overwhelming empirical support, recent research on the CHESS Interactive Internet Health System (Lee, Hwang, Hawkins, & Pingree, 2008) is more promising. The study showed there were interactions between negative emotion (the extent to which people were sad, nervous, or worried) and self-efficacy on patients’ use of health information. In this case, patients experiencing negative emotions sought information when self-efficacy was high. Testing efficacy and outcome expectancies as moderators will provide a greater understanding of their interactions with anxiety and indirect impact on information management.

Issue Importance

Tests of the TMIM also point to the necessity of an issue importance variable in the TMIM. Issue importance refers to whether the issue in question is meaningful to an individual and has been shown to contribute to the fit of the TMIM model (Afifi et al., 2006). A similar type of variable is included in other theories of information seeking. Johnson's (1997) Comprehensive Model of Information Seeking (CMIS) uses a salience variable that is defined as "personal significance of health information to an individual and is related to the degree of perceived health threat an individual feels" (Johnson & Meischke, 1993, p. 347). Tests of the CMIS have shown salience affects information seeking actions to some degree (Johnson & Meischke, 1993).

One of the goals of this dissertation is to more formally consider the role of issue importance in the TMIM framework. In the CMIS model, salience predicts the perceived utility of communication channels and resulting information seeking behaviors. Dutta-Bergman (2005) uses a similar concept, labeled health consciousness. Health consciousness is defined as one's level of motivation or interest in a specific topic, issue or product. It was also shown to be one of the strongest predictors of health information seeking (Dutta-Bergman, 2005). These studies suggest that issue importance will have an impact on information management. Therefore, it is proposed that issue importance be included alongside efficacy and outcome expectancies in the TMIM, positioned as a moderator of the relationship between anxiety and information management. High issue importance should increase the likelihood of direct information seeking.

Anxiety

Tests of TMIM have verified that uncertainty discrepancies are anxiety provoking and do influence evaluation and decision-making. However, as discussed earlier, only one source of

anxiety is included in the model. The model looks *only* at anxiety produced by the uncertainty discrepancy, ignoring other potential sources of anxiety that may influence information management. In the context of family health history, two additional sources of anxiety flow from the literature that may stimulate information seeking. One is risk-related anxiety about what is contained in a family health history. A second source of anxiety relates to the process of the information seeking.

Risk-related anxiety refers to anxiety individuals may hold about their own level of risk. Lowenstein et al. (2001) points out that responses to risky situations may come from a variety of emotional influences and may include feelings such as worry, fear, dread or anxiety. In this context, I propose that anxiety may result from the perception of risk from family health history. In the context of genetic testing, for example, people could be seeking out genetic testing to reduce anxiety they feel about their level of risk. Anxiety could result from an uncertainty discrepancy (i.e. “I have more uncertainty than I would like to have about my risk for breast cancer”), as well as from their own perceived risk (i.e. “I think there is a good chance I have the BRAC1 mutation and might develop cancer some day”).

Two models of information seeking support the notion that risk perceptions may increase anxiety and influence information seeking. The Risk Information Seeking and Processing Model (RISP) proposes that the perception of hazard or risk causes an affective response that predicts feelings of information insufficiency (Griffin, Dunwoody, & Neuwirth, 1999). Tests have shown that people who experienced an affective response to risk perceived the knowledge they held as insufficient, which is proposed to predict information seeking and processing behaviors (Griffin, Neuwirth, Dunwoody, & Giese, 2004). Rimal and Real’s (2003) Risk Perception Attitude (RPA) Framework also suggests that heightened levels of risk will generate anxiety, which acts as a

motivational force to seek information when efficacy is high. They have shown that when people receive a high-risk diagnosis for a deadly disease, risk-induced anxiety evokes individuals' intentions to seek information, tempered by their efficacy beliefs (Turner et al., 2006).

Information search anxiety may be another source of anxiety in the model. While people may feel anxious because they are uncertain or feel at-risk, they may also feel anxious about the potential interpersonal information search that lies ahead of them. Thus, anxiety resulting from an anticipated information search may be a barrier to information searching. This proposition is best supported by Wilson's (1999) Information Seeking Behavior Model that posits a variety of intervening variables. These variables "prevent the initial emergence of a coping strategy, or may intervene between the acquisition of information and its use" (Wilson & Walsh, 1996). Among these intervening variables are emotional characteristics (i.e. nervousness or worry) and social/interpersonal variables. Wilson and Walsh (1996) state that interpersonal problems are likely to arise when interpersonal interaction is needed to gain access to information. Thus, individuals who experience anxiety as they anticipate an interpersonal interaction may be less excited about a search for information.

It is expected that these additional sources of anxiety, when included in the model, will help explain additional variance in information seeking. Broadening the measures of anxiety is one small step to understanding the role various emotions play in the TMIM. This step is important not only to our understanding of the model, but also to our understanding of health information management. Emotions are generally not considered in the context of information seeking and is relatively unexamined in the literature (Griffin et al., 1999). Afifi (2008) has also recognized the need to examine the role emotions play in information management decisions, as well as how they impact assessments and mediate the choice of strategies people choose. Just as

affective states can influence message processing (Bohner, Chaiken, & Hunyadi, 1994) and emotional reactions influence persuasion (Dillard & Nabi, 2006), they may also influence information management decisions.

Efficacy Measurement

The final issue to address in the TMIM is efficacy. Every test of the TMIM framework has called into question whether the three unique forms of efficacy form one latent efficacy construct, as predicted by the model. Since none of the studies found support for a three-factor efficacy construct, an initial reaction is to suggest that these three forms of efficacy do not reflect one factor. However, as Afifi and Weiner (2006) suggest, the problems with efficacy may be methodological. One criticism of the past tests of the TMIM is that Afifi colleagues have never confirmed whether the individual items used to measure each type of efficacy are unidimensional. They simply calculate a Cronbach's alpha to determine whether the measures are reliable ($\alpha \geq .70$) and sum them. These parceled sets of items representing each item are then tested in a measurement model to determine whether the three items reflect one factor. Determining whether the sets of items measuring each item are unidimensional may go a long way in explaining why efficacy has not been tested as a latent variable. Netemeyer, Bearden, and Sharman (2003) note that establishing dimensionality is an important part of scale development and that "it is almost impossible to develop good measures of a construct without knowledge of the construct's dimensionality" (p. 18).

It is important to note that coping efficacy is the least reliable of all three forms of efficacy and has performed poorly in 2 out of 3 studies of the TMIM. Thus, improving measures of coping efficacy in particular may have an influence on the overall fit of the efficacy measurement model. Coping efficacy is defined as the extent to which people believe they can

cope with the expected outcomes of an information search, but measures of coping efficacy have assessed coping with negative information only. Afifi and colleagues assumed coping efficacy affects decisions only when outcomes and information are expected to be negative, but discovered later that people do not always expect negative information (Afifi & Weiner, 2006). Thus, measures of coping efficacy should reflect both positive and negative coping abilities. Afifi and colleagues have recently developed new measures for coping efficacy that assess people's ability to cope with both positive and negative outcomes of information seeking. These new measures will be used in the present study.

Hypotheses

Based on the modifications presented here, Figure 2.2 represents a revised TMIM model. This model focuses on the structural aspects of the TMIM that have been less consistent while maintaining the most reliable parts of the model. The aim of the study is to confirm the model structure while also uncovering important information about family health history information seeking. To test the basic structure of the model, the following hypotheses are posed: (H1) family health uncertainty discrepancy predicts uncertainty-related anxiety; (H2) uncertainty-related anxiety predicts intention to seek family health history information; (H3) uncertainty-related anxiety partially mediates the relationship between uncertainty discrepancy and intention to seek family health history information; and (H4) issue importance, efficacy, and outcome expectancies moderate the relationship between uncertainty-related anxiety and intention to seek family health history information. Specifically, it is expected that anxiety will increase intention to seek information when outcome expectancies, issue importance, and efficacy are high and decrease intention to seek information when outcome expectancies, issue importance, and efficacy are low.

In addition to these hypothesis, one final research question (RQ1) was posed to better understand the role of additional sources of anxiety in the proposed model. This question posed was this: Do risk-related anxiety and information search anxiety account for some of the variance in intention to seek family health information?

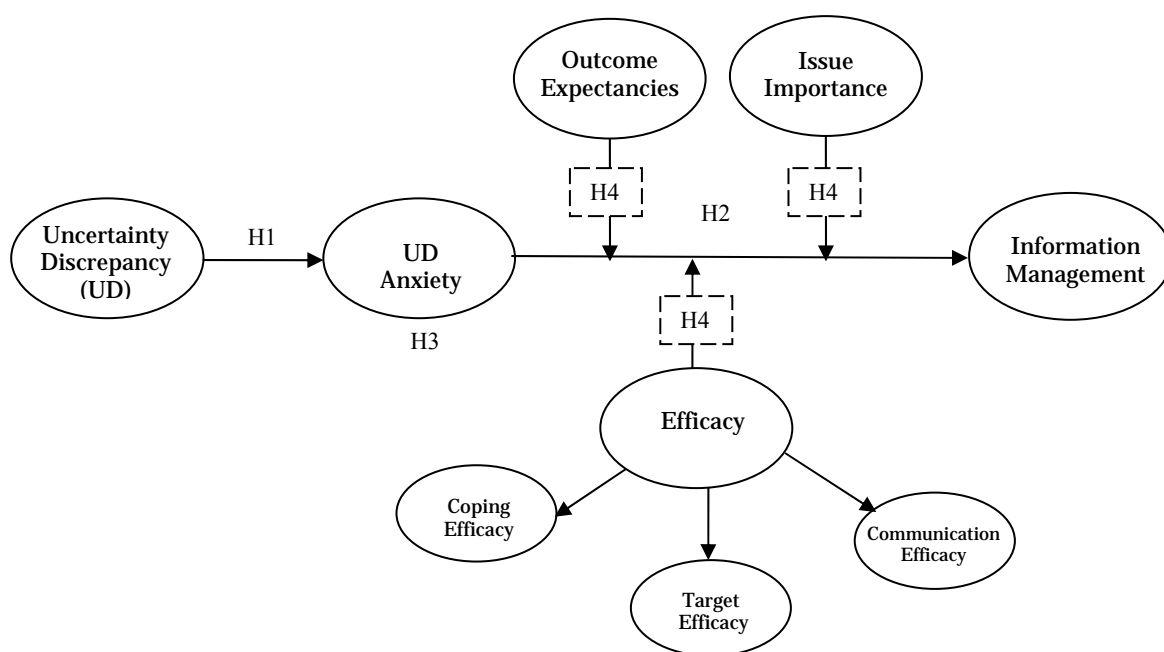


Figure 2.2: *Revised TMIM model*

The TMIM in Context

Before describing the methods for testing these hypotheses, it is important to situate the TMIM in the context that it was tested in. While the primarily goal of this dissertation is to refine the theory, a secondary goal is to understand more about the factors that predict family health history information seeking. There is much to learn about the communication of health information in families, but research that has been conducted (especially related to genetic testing) can offer insight into how the TMIM might function in this context.

The literature suggests that seeking family health history for one's personal knowledge is unlikely, unless triggered by a specific health event. As referenced earlier, a study conducted by the Centers for Disease Control showed that only 30% of people have actively collected information to develop a family health history (Yoon et al., 2004). People often assume they already know everything about their family history and are not concerned about it until a close relative is diagnosed with a disease (Foster, Watson, Moynihan, Jones, & Eeles, 2002).

Significant health events may raise uncertainty and act as a catalyst for health information seeking (not just about family history). Studies have shown that women attend genetic assessment clinics because of a need for information and testing to help them regain a sense of control over their risk (Brain et al., 2000). Johnson et al. (2005) also found that people who believed cancer ran their family were more likely to seek information. Having a relative affected by cancer is also shown to be an impetus for information seeking. Some 75% of patients with a relative affected by cancer indicated they would like to learn more about hereditary cancer and genetics (Allen, Briceno, & Piver, 1998). People experiencing a relative's cancer also sought information to have more accurate risk perceptions and to increase feelings of personal control (Chalmers, 1996). But, uncertainty is not necessarily a predictor of information seeking. Some people who suspect a risk will avoid information if it causes them stress or discomfort (Case, Andrews, Johnson, & Allard, 2005).

Anxiety

The TMIM predicts that uncertainty discrepancies cause anxiety that motivates people to manage information. In the genetic testing literature it has been shown that anxiety can act as a predecessor or a predictor of genetic testing, which Johnson et al. (2005) considers a form of information seeking. Croyle and Lerman's (1999) review of the literature clearly shows that

cancer-related distress (worry, anxiety) and the perception of risk (especially exaggerated risk) are associated with the uptake of counseling. Chalmers (1996) also found that people experiencing cancer with a relative sought information to minimize anxiety and to help them manage their own risk.

Uncertainty about one's family health history may not be enough to trigger anxiety, however. Studies on cancer have also shown that even people who *are* aware of a family history of the disease may not realize their own risk is increased or may underestimate their risk (Audrain-McGovern, Hughes, & Patterson, 2003; Cormier, Kwan, Reid, & Litwin, 2002; Drossaert, Boer, & Seydel, 1996). Misconceptions about heredity and genes also contribute to a lack of anxiety or concern about family health history. Despite having a fairly good understanding of genetics, people still have misconceptions about disease causation and the role of personal behavior on disease incidence (Parrott, Silk, & Condit, 2003). Kenen and colleagues (2003a) found people held several misconceptions about genes and breast cancer including the belief that "mutations can go 'in and out' through the generations of their family," or the belief that "as you count down through the generations the chance of someone carrying the mutated breast cancer gene gets less and less," (p. 850). Still, as Condit (in press) points out, the lay public's understanding of genetics does overlap with professionals. However, their understanding of genetics tends to be more general, is understood through the lens of heredity, and is influenced by models of social relationships and familiarity with particular health conditions.

Moderating Factors

The TMIM proposes that people choose information strategies in response to anxiety about an uncertainty discrepancy, but there are other moderating factors that may influence the

choices that people make. These factors include issue importance, outcome expectancies, and efficacy. The research on family health history and genetic testing supports that these factors play a role in real-life information seeking, much as they do in the model. In the case of issue importance, research shows people are more likely to seek information or testing when they are convinced that a health condition is in their family (Green, Richards, Murton, Statham, & Hallowell, 1997) or when a relative is affected by cancer (Johnson et al., 2005).

People's expectations about the process or outcomes of an information search (including the costs and benefits) have also been shown to influence their behavior. Factors such as age gaps, losing touch, or not being close to family have all been shown to inhibit people from asking about family health history (Green et al., 1997). Having to communicate with relatives beyond the immediate family may also lower outcome expectancies. The research on disclosure of genetic testing results consistently shows people are more likely to reveal results to close relatives (Claes et al., 2003; Hughes et al., 2002; Keenan et al., 2005; Ormond, Mills, Lester, & Ross, 2003) and within nuclear families (Koehly et al., 2003). Individuals also are more likely to disclose information to individuals who have the closest emotional ties rather than genetic relationship (Gaff, Collins, Symes, & Halliday, 2005).

Even if the topic of family health history is important to people, and they expect positive outcomes from an information search, it does not guarantee they will feel efficacious enough to seek the information or trust that their family can provide it. Weiner, Silk and Parrot (2003) write that discussions about genetic issues can pose psychological, biological, ethical, moral and relational issues and found that families, regardless of race, rarely discuss genetic issues with each other. Thus, efficacy is an especially important determinant of information seeking.

The majority of research related to efficacy relates to communication efficacy. Research on disclosure of genetic testing results shows that an individual's confidence in their ability to share genetic testing results is a significant predictor of their intention to tell relatives (Barsevick et al., 2008). High versus low communication efficacy may be the result of family experience and norms for communication about family health history. The literature suggests most families do not talk directly about their family history. While many say they have always known their family history, others more gradually realized family history as relatives became affected by disease or when a relative died at a young age (K. Forrest et al., 2003; Foster et al., 2002). Health history may be only fleetingly mentioned or not shared until a family member has cancer (Kenen, Arden-Jones, & Eeles, 2003a). Experiencing cancer can increase communication in families, however. In the case of genetic testing, the diffusion of information may increase in families already affected by the condition (Foster et al., 2002; Ormond et al., 2003).

Individuals from families that are more cohesive or who offer more support towards each other might also feel more efficacious. Biesecker et al. (2000) found that greater family cohesion was a predictor of a decision to undergo genetic testing for breast cancer. However, more recent research by Bowen and colleagues (2004) found that family cohesion was not a predictor of genetic testing and that family communication regarding breast cancer risk was low. Thus, it is not clear how family cohesion and openness might influence whether people seek information.

Coping Efficacy

In addition to communication efficacy, the TMIM predicts that individuals will assess whether they can cope with the process of information seeking and the information (positive or negative) they might receive from family members. The act of information seeking is often seen as a coping mechanism, helping to reduce negative reactions to uncertainty, and provide

reassurance (Lambert & Loiselle, 2007). However, it may also increase feelings of worry or concern. In the case of genetic testing, people report the biggest drawback to a positive genetic result is the anxiety along with health monitoring and lifestyle changes (Julian-Reynier et al., 1996). A patient's emotional reaction to genetic testing and their emotional relationship with relatives are also factors making them less likely to warn at-risk relatives (Dugan et al., 2003). Individuals who don't feel they can cope may prefer to avoid information and maintain a level of uncertainty and/or anxiety. In this study we expect that those who have higher coping efficacy are more likely to use direct information seeking strategies.

Target Efficacy

The final assessment of efficacy in the TMIM is that of target efficacy, which is similar to the concept of response efficacy. Weiner, Silk and Parrot (2003) showed that response efficacy facilitated conversations about medical history and encouraged discussions about medical history and past experience with genetic testing or prenatal screening. In the context of family health history target efficacy is an assessment of whether family members will be willing and able to share information and honest in their responses.

The research points to several reasons why target efficacy related to family health history may be low. The first point relates to target ability or why family members may not have needed information. While the incidence of disease in a first generation relative is likely to increase personal knowledge (Foster et al., 2002), in second and third generations the disease may go unnoticed. Research also shows that older people often do not know the cause of death for deceased family members and would have difficulty answering family health history questions (Ford et al., 2002). Families sometimes treat the deaths of younger family members as "suspicious" while treating the deaths of older people as natural or normal (Foster et al., 2002)

and not disease-specific. Thus, efforts to obtain family health history may not produce accurate and complete information

There are also reasons why family member targets may not be honest or open about communicating family health information. A thread appears in the literature whereby people are fearful to share information because they fear being the one to cause concern. Hamilton et al. (2005) found that some family members may hold cancer secrets, and keep these secrets, to avoid being blamed for the cancer. Additionally, family members may feel guilty communicating genetic testing information as it shifts family perceptions of breast cancer from a sporadic event to family disease that puts everyone at risk (Tercyak et al., 2001).

Family Health Information Seeking

Information Seekers. The expectations, according to the TMIM, are that under conditions of uncertainty and discrepancy people will use information seeking strategies (either directly or indirectly) when they expect positive outcome expectancies and feel efficacious. Interestingly, the literature presents very consistent findings in terms of who family health information seekers are. A national survey conducted by the CDC showed that people who had collected family health information were more likely to have been married at some point, female, and educated beyond high school (Yoon et al., 2004). Another CDC study showed that a complete family history was more commonly reported by older people, women, whites, and higher income groups (Ramsey, Yoon, Moonesinghe, & Khoury, 2006).

Information Avoiders. In contrast to information seeking, the TMIM proposes that some people, even when experiencing anxiety and uncertainty, will choose to avoid information. The decision to avoid information may be due to factors such as issue importance or a lack of

confidence in one's ability to obtain the information and cope with it. As the literature shows, family beliefs and communication patterns may be serious deterrents to communication.

Beliefs about outcome expectancies or the usefulness of family health history may be bigger predictors of information avoidance, however. There is a growing literature on the topic of genetic determinism (the idea that only genes determine your health) and fatalism (not responding to risk because you feel there is little you can do). Individuals who hold these attitudes may expect little benefit from information seeking.

Not every study shows people are fatalistic or that family history increases feelings of fatalism (Senior, Smith, Michie, & Marteau, 2002), but research would suggest it can. Fatalistic views were found among women attending a genetic testing clinic for the first time (Kenen, Ardern-Jones, & Eeles, 2003b). Kash (1992) also found that women who perceived high susceptibility to breast cancer engaged in fewer preventative behaviors than did women who perceived a moderate chance of developing breast cancer. Furthermore, they found that women with high-risk perceptions had high anxiety, felt there was little they could do, and were less compliant with examinations and other prevention behaviors.

Additional Research Questions

While the primary overall goal of this study is to refine and test the TMIM, there is also a need to understand more about family health information seeking. Very little research on family health history exists in general and nearly all these studies examine health history gathering prior to genetic counseling. These studies are helpful as they illustrate important situational and familial characteristics that influence information seeking. However, genetic testing is not the only context that people seek family health history information in. One of the aims of this dissertation is to learn more about family health information seeking behaviors among more

general audiences (who may not be aware of their risk) to advance the literature in this area.

Thus, two exploratory research questions and one hypothesis are posed in this study about family health history.

The TMIM model begins with uncertainty, but it does not provide much insight in the source of the uncertainty. The first research question reflects an interest in understanding the situations that produce uncertainty discrepancies and cause information seeking about family health history. While the literature is clear about the fact that family health history seeking occurs when families experience health problems or prior to genetic testing, it is less clear about other times (family gathering, family deaths, etc.). Gaining a better understanding of the experiences that trigger uncertainty and the times in which families do talk about family health history is important, as these may be golden opportunities for health communication. Thus, the following research question is posed -- What situations prompt family discussions about family health history? (RQ2).

One consistent finding in the family health history literature is that there are gender differences in terms of information seeking and provision of family health information. Women more often than men report that it seems normal to talk about genetic issues (Bowen et al., 2004; Costalas et al., 2003). Female family members also talk more often about risk, family health history, and genetic testing than males (K. Forrest et al., 2003; L. E. Forrest, Burke, Bacic, & Amor, 2008; Green et al., 1997; Hughes et al., 2002; Koehly et al., 2003; Patenaude et al., 2006). Women are also among those asked first about family health history, are informed first about genetic testing, and are often expected to pass on information (Gamm, Nussbaum, & Biesecker, 2004; Hunt, Davison, Emslie, & Ford, 2000; Sanders, Campbell, Donovan, & Sharp, 2007). These results suggest that women are the keepers of family health information. Thus, it is

expected people intend to approach female family members before male family members to learn more about their health history (H5).

If women are more often approached for family health history information, it raises the question of why they have more information. Theories of information seeking such as the Risk Information Seeking and Processing Model (Griffin et al., 1999) and CMIS (Johnson, 1997) suggest that demographic factors may influence informational needs and decisions to seek information. Much like Afifi and colleagues assessed racial differences in the TMIM (Afifi et al., 2006), this dissertation focuses on gender differences. Differences are assessed across the TMIM model variables with the guiding question – Are there gender differences in the way individuals manage information (RQ3)?

CHAPTER 3

METHODS

Overview

The goal of this dissertation was to test the TMIM's ability to account for information management decisions about family health history. This study tested the validity of anxiety as a mediator of the relationship between uncertainty discrepancy and direct information management. It also investigated whether high efficacy, issue importance, and outcome expectancies increased the likelihood of direct information seeking. The study was conducted in two phases. First, a small interview-based pilot study was undertaken to assist in development of the survey instrument and to understand more about the family health information seeking context. This was followed by a larger survey-based study to quantitatively assess the explanatory power of the TMIM.

One of the challenges in testing the TMIM is ensuring that uncertainty discrepancies and anxiety are present, because these variables act as the primary motivators of direct information seeking. To fully test the model, it was essential to increase feelings of uncertainty and raise anxiety among participants about their family health history. But, as the previous review of the literature shows, people are often not concerned about family health history until faced with a personal health problem (Weiner & Durrington, 2008). One of the major reasons for the pilot study was that it allowed for the evaluation of health messages to raise uncertainty and anxiety levels about family health history. Because the TMIM has not been tested in the context of family health history, it was also essential to understand whether people view health history as a

important health topic, to better understand their communication about this issue and to identify a survey population for the main study. This chapter outlines the goals, methods, and results of the pilot study as well as main study methodologies.

Pilot Study

As stated previously, the goals of the pilot study were to (a) assess participant reactions to TMIM measures to be used in the main study, (b) assess whether a family health history message could raise uncertainty and anxiety, and (c) assess whether individuals were concerned about and would seek information about their family's health history. As Atkin and Freimuth (1989) suggest, formative research can be useful for message design to identify target audience knowledge, attitudes and values, priorities, efficacy and skills.

Pilot Study Design

The pilot study was conducted using telephone and in-person interviews (n=50). In October 2008, ten undergraduate health communication students each conducted five interviews with adult friends and family members as part of a course service requirement. Demographic data were not collected on all 50 participants because the interviewers did not always record this information. For those it was collected from (n=28), it was found that over 77% (n=12) were Caucasian, 18.5% (n=5) were black, and 3.7% were other (n=1). The sample was also split in terms of gender with 46.4% female (n=13) and 53.6% male (n=15). Additionally, students interviewed more friends (n=20) than family members (n=4). Four people did not report their relationship with the person they interviewed.

All participants were read a short message about the importance of family health history and were asked a series of open- and closed-ended questions measuring TMIM variables. In past studies Afifi and Weiner (2006) assigned participants to an experimental (message) group or a

control (no message) group. However, they found no significant differences between groups (those receiving a message and those who did not). Therefore, all participants in this pilot study received the same message. An interview method was chosen over paper surveys because it allowed interviewers to probe for additional information about each of the model variables and provided immediate feedback to the interviewer when a question was confusing or unclear.

Pilot Study Protocol

Before conducting any interviews, a training session was held for interviewers to review and practice the interview protocol. Interviewers had the option to conduct interviews in-person or via phone and, in lieu of audio taping, were required to take detailed notes and record observations. The complete interview protocol is included in Appendix A.

After they reviewed and signed an informed consent form, participants were read a short message about the importance of family health history and were informed of the family health history information they should know (including major medical conditions, age of onset, and age of death for immediate and extended family). They were also asked two questions about the importance of family health history to them and to their health in order to gauge issue importance.

Participants were then asked a series of closed and open-ended questions to assess responses to each of the TMIM variables. Questions were based on those developed by Affifi and Weiner (2006) and Affifi et al. (2006). Uncertainty Discrepancy was assessed by asking participants to state whether they agreed, disagreed, or were somewhere in the middle about the statements “I have complete and adequate information about my family’s history” and “I wish I knew more about my family’s health history.” The latter was examined to determine whether uncertainty discrepancies were present. A 3-point scale was used for the sake of simplicity.

Anxiety was assessed by asking participants whether they agreed, disagreed, or were somewhere in the middle about the statements “The difference between how much I know and how much I’d like about my family health history makes me uneasy” and “Not having as much information about my family health history as I would like makes me nervous.” Outcome expectancy was assessed by asking participants if they thought talking to family members would produce positive outcomes, negative outcomes or both. Participants were also asked if they anticipated any benefits from talking to family about their health history.

Communication and target efficacy were also discussed. To assess communication efficacy participants were asked to state whether they had the skills to talk to their family about family health history and whether the conversation would make them anxious. Target efficacy was assessed by asking participants to indicate whether family members would be upfront and willing to share family history information and also whether some members would be more willing than others to share.

To measure coping efficacy, participants were asked to imagine a situation resulting from family health history information seeking and were asked how they would cope (i.e. “imagine that a family member became upset when you asked what a relative had died from”). These questions were problematic, however, because participants were asked to indicate what they would *do* to cope instead of how *well* they would cope. As a result, participants provided a list of things they would do instead of talking about how confidently they could cope with the news (which is of interest in this study). Therefore coping efficacy was not included in the analysis.

Finally, information management strategies were assessed by directly asking participants how they would go about getting family health information. They were also asked to pick from

three phrases, either (a) directly asking about health history, (b) indirectly asking, or (c) avoiding information. A follow-up question asked participants to indicate why they chose that phrase.

After interviews were complete the interviewers came together for a debriefing meeting. At this meeting interviewers discussed initial reactions, major themes of the interviews, and any problems with the survey questions. Following the meeting, interviewer notes were transcribed into an Microsoft Excel spreadsheet for analysis.

Analysis of Pilot Study Data

Pilot study interviews included a mixture of closed and opened ended questions. Descriptive statistics (frequencies) were used to examine the closed-ended questions because the variables were categorical. Questions with a closed responses were those measuring uncertainty discrepancy and anxiety (agree, disagree, in the middle), outcome expectancies (negative, positive, or both) and information management (direct, indirect or avoidance).

Open-ended questions were analyzed using a content analysis approach. The author of this dissertation and an undergraduate research assistant, after reading through the interviews closely, developed an initial strategy for coding (i.e. grouping) responses to each of the open-ended questions (codebook in Appendix B). The choice was made to analyze the responses by question, as opposed to looking at general themes, to better understand each TMIM variable individually. The two coders coded all interviews separately and then compared results. An 80% intercoder agreement standard was used. For questions that fell below the 80% standard, the coding strategy was refined and the question recoded. After recoding these questions, differences were resolved between the two coders by comparing answers and discussing until reaching 100% intercoder agreement on all codes. When coding was complete, the codes for each question were sorted and counted to identify major content areas within each question. Results of quantitative

and qualitative analysis, by variable, appear below. The words that appear in quotes represent participant comments recorded by the interviewer.

Pilot Study Results

Uncertainty and Anxiety. Only 28% of participants (n=14) in this study agreed that they had complete and adequate information about their family health history, while 52% of participants (n=26) disagreed with this statement. Twenty percent (n=10) indicated they were somewhere in the middle. Thus, more than half of people acknowledge a lack of information or uncertainty about their family health history. Additionally, 60% of participants (n=30) interviewed wished they knew more about their family health history. Only 14% (n=7) disagreed with the statement while 24% (n=12) were somewhere in the middle, suggesting that uncertainty discrepancies are likely to exist. Crosstabs analysis also showed that over 69% of people (n=18) who did not have complete and adequate information wished they had more information about their family health history. Thus, participants were not only uncertain about their family health history, but desired more information. This finding was encouraging as it showed people in this study did experience uncertainty discrepancies.

Averaging the percentages for the two anxiety measures, it was found that only 17% of participants agreed they were uneasy or nervous about gaps in their family health history knowledge. Seventy-one percent of people disagreed with this statement and 12% were somewhere in the middle. These results indicate that even though people wished they had more information about their family health history, the uncertainty generally did not increase their anxiety level. This finding was further reflected by participant responses to the words used to assess anxiety. People in this sample were more likely to agree they felt uneasy (24%; n=12) than nervous (10%; n=5) about gaps in their family history knowledge. The word uneasy is

likely more reflective of the low anxiety exhibited in this pilot study than the word nervous. The comments of participants would seem to reinforce this statement. One participant said “I don’t feel nervous exactly, but just have a desire to know more,” another said “I would like to know, but it does not upset me that I do not know more, “ while another said “I wouldn't say it makes me nervous because I don't dwell on it.”

Further analysis of the open-ended responses revealed that some people did not feel anxiety about family health history information because they believed they had adequate information already. As one person said, “I know lots of information about my family's health history.” Other people said they were not nervous about their family health history because they just don’t think about it or don’t worry about their family health. “It is not something I think about,” one person said, “I think medical technology has come a long way so that the things I don't know, they will be able to detect.” These responses reflect the low levels of anxiety reported in the study and the fact that uncertainty about family health history may not be extremely anxiety provoking.

Information Management. Despite the lack of anxiety, people overwhelming said they would choose a direct information strategy. When participants were asked how they would go about getting family health history information, 86% (n=43) said they would ask directly versus 6% (n=3) choosing an indirect strategy and 8% (n=4) choosing an avoidance strategy. When asked why they would choose a direct strategy, the content analysis revealed two major reasons. The first is that many believed a direct strategy would be the most efficient and most direct way of getting the information they needed. Someone said they would choose a direct strategy “because I want to know as much information concerning my health as possible and approaching the participant head on is the best way to get answers.” The second reason to use a direct strategy

was because they already had open and honest communication within their family. “That is how my family is,” one person said, “Very direct. We don’t beat around the bush.” To a lesser extent, people said they would seek family health information directly because they thought the information was important and because they wanted to “know as much information as possible.”

People who chose avoidance generally reported communication problems within the family. People said that they would use this strategy “because my family doesn't really get along with one another or talk about sad issues” or because “I don't want to know more and I really don't want to deal with my family because they suck” These comments reflect the fact that family communication issues may overwhelm even a strong desire for health history information. People who chose indirect strategies commented that they would use this strategy because “some things I really want to know, but aren't sure who to ask” or because they don't generally ask for personal health information. Thus, people had very different reasons for choosing an avoidance versus an indirect approach.

Predictors of Information Management. The fact that people indicated they would use direct strategies is not surprising upon examination of the predictors of information management. Content analysis showed that the majority of people interviewed thought family health history information had some degree of importance to them. Over half of people interviewed thought that the topic was very important and nearly everyone thought it was at least somewhat important.

One person said that “it used to not be important but now it is very important to me” while another said it was “very ,very important” due to an illness that could have been prevented if the participant knew more family information ahead of time. The topic was more or less important to some people based on what they already knew. One said the topic was “extremely

important, my family has had many health issues, I want to know if these issues will affect me.” Another said “We don’t really have any history of illness in the family except for alcoholism. If we did though, I think it would be very important” which seems to imply the topic is not important to them because there is little history of disease in their family.

In addition to being important, participants expected positive outcomes from talking with their family members. Of the total sample, 61.7% of people (n=32) expected positive outcomes from talking with family members while only 2.1% (n=1) expected negative outcomes and 36.2% (n=17) expected both positive and negative outcomes. Content analysis revealed that people overwhelmingly thought the positive benefit of talking to family would be the information and personal knowledge gained about family health and personal risk factors. People who thought it would have both positive *and* negative outcomes mentioned that while the information would be helpful, it was also potentially upsetting. They also expected different outcomes depending on whom they talked to. One person said it would be “positive with my parents,” and “maybe negative with my extended family.”

In terms of the benefits that might come from talking to their family about health history, the major theme was that people could gain greater awareness or knowledge about health conditions. Participants also talked about using the information to engage in prevention behaviors and to better identify warning signs and symptoms of disease. As one participant stated, “I would know what health risks I have according to family history. This will help me to better determine how I need to take care of myself in the future.” Thus, participants seem to be well aware of the benefits of knowing their family health history.

In addition to outcome expectancy, communication and target efficacy were both high. When asked whether they had the skills to talk to their family (communication efficacy), over

90% of people interviewed believed they did have the communication skills to get the family health information they need. The majority also reported it would not make them anxious to have conversations with family members about their health history. The most common reason people felt comfortable talking to their family was because they had open communication and good relationships with family members. One person said “It wouldn't make me anxious because my family and I are very close and we are able to have important conversations like this.”

Individuals who were anxious about talking to their family about health history mentioned not having open relationships with family members, being afraid of what they might find out, and not wanting to talk to family members. One participant expressed concern about communication with family members because “we don't have good health history and will see all the diseases that run in the family.”

In terms of target efficacy, over 90% of people interviewed said “yes” they did think their family would be upfront and willing to share the information they had. Many who answered yes to this question said they thought their family would be willing to share or have shared this information with them already. While over half of participants reported that some family members would be more willing than others to share the information, 68% of people (N=34) reported they did not think family members would hide information from them. Many felt their families were upfront and honest and would have no reason to hide the information from them. When asked if they thought some family members might hide information, one participant said, “No because my family is very open, honest, and caring. They would willingly give me knowledge to improve my health.”

Interestingly, though, about 30% of people interviewed did think their family might hide information from them. The reasons were mixed and included such things as being embarrassed

or ashamed about the health conditions, not wanting to burden others with the information and making others worried, as well as not sharing because the topic was difficult for them. As one participant said, “they might try to protect me from something they think would make me nervous.”

Pilot Study Summary

The goals of the pilot study were to (a) assess participant reactions to TMIM measures used in the main study, (b) assess whether a family health history message could raise uncertainty and anxiety, and (c) assess whether individuals were concerned about and would seek information about their family’s health history. While the results of this small pilot are not generalizable to the larger population, they do reveal important considerations for measuring TMIM variables in the main study.

The first goal of the pilot study was to assess participant reactions to TMIM measures. Overall, the questions used to measure each of the TMIM variables appeared to solicit the desired response, but participants had different reactions to the word “nervous” than to the word “uneasy.” Because participants had low levels of anxiety, it is not surprising they agreed more with the word uneasy. The finding suggests that the word nervous is more negatively valenced than the word uneasy and may be a more appropriate choice for measures of anxiety, especially given the definition of anxiety used in this study (a stress response which individuals desire to predict or control). As a result, the word nervous was maintained in the main study along with the words anxious and worried.

The second goal of the pilot study was to assess whether a family health history message could raise uncertainty and anxiety about family health history. The most notable finding of this pilot was that study participants reported minimal anxiety, even when uncertainty discrepancies

were present. One explanation is that the family health history message used in this study (which stressed the importance of family health history and the information that should be gathered) was not effective at raising uncertainty discrepancy to the point where people felt anxious. While it seems to have reinforced to participants the importance of obtaining family health information, it may not have been anxiety provoking enough. In some ways this is not surprising given research that suggests that mediated health communication campaigns may have small effects on health behavior short-term (Snyder et al., 2004). As a result of these findings, participants in the main study were asked to record their family health history for four chronic diseases to reveal where knowledge gaps lied.

A second explanation for reports of low anxiety is that anxiety may not be a typical response to uncertainty discrepancy in this context. It may be that a lack of knowledge about family health history is not as threatening as personally experiencing or watching a family member experience a health condition. An additional explanation is the relevancy of the topic to participants. The majority of people in the pilot study were friends of college students, likely in their early twenties and in good health. People in this demographic may not have felt anxiety about information gaps because the topic did not feel relevant to them. These results suggested it would be essential to identify target participants with an interest in family health history for the main study. Participants recruited for the main study were engaged individuals planning to get married. It was expected the topic would be relevant as they plan their life with their fiancé and contemplate having children.

The third and final goal of the pilot study was to assess whether participants were concerned about the topic of family health history and would seek information about their family's health history. Despite the fact that anxiety was low in this pilot study, people still

seemed to recognize the importance of family health history. Additionally, the model performed as expected whereby uncertainty discrepancies, high efficacy, issue importance, positive outcome expectancies, and direct information seeking were found. One notable finding, though, is the lack of variance in information management. Almost everyone in this study said they would seek information directly. Very few people said they would indirectly seek or would avoid information about family health history. The lack of variance was likely due to the small sample size and the fact that participants were forced to choose *one* type of information strategy rather than indicating the degree they might use multiple strategies. As a result, all participants in the main study were assessed on both intention to seek information (directly and indirectly) and their intention to avoid information.

Main Study Methods

Because of lessons learned in the pilot study, some significant methodological changes were made in the main study. These changes had to do with the technique used to raise uncertainty within the sample population. Because a message about family health history was not particularly effective at raising uncertainty or anxiety, an alternate means was needed to encourage people to assess their knowledge of family health history. Reading through the pilot study transcripts it was clear that people *generally* thought they knew their family health history. However, as the literature suggests, it is likely for people to be unaware of a positive family history until they develop a disease themselves (Weiner & Durrington, 2008).

Rather than using a hypothetical message, participants were asked to record their family health history for four chronic conditions (heart disease, diabetes, stroke, and cancer). Due to time constraints, only four common health conditions were assessed that have been shown to

have a genetic component. These are the same four diseases the Department of Health and Human Services assessed in their *My Family Health Portrait* software.

There were no conditions or control groups used in this study. To raise awareness of gaps in knowledge about family health history, all participants received a short message about the importance of family health history and were asked to indicate whether their immediate family members (mother, father, sister, brother) and extended family (grandparents) had experienced any of the four health conditions and, if so, the age they were diagnosed. They were also asked to indicate whether they knew what health conditions their great grandparents died of (if they were no longer living) and if they knew whether extended family members (aunts, uncles cousins) had been diagnosed with any of the four health conditions. Participants were then asked about discussions of family health history, knowledge of family health history, and intention to seek family health history information.

Study Participants

Participants recruited for the main study were engaged individuals (males and females). It was expected the topic of family health history would be relevant and important to engaged individuals as they plan their life with their fiancé, learn more about their own and their partner's family, and even contemplate having children. Individuals were recruited to participate online and in-person at bridal fairs in the Southeastern United States (N=306).

Over a period of roughly six weeks, 167 individuals began taking the survey online. Of these 167 surveys, 20 were excluded because they contained little or no data. An additional 13 surveys were started and not finished. Of these 13 surveys, 6 were removed because more than half the survey was incomplete. The final online sample size was 141. At bridal fairs, 169 individuals completed the paper version of the survey. Of those 169 people, four were dropped

from the sample because there was a question about whether the participants were engaged or because over half the survey was incomplete. The final sample size for the bridal fairs was 165. The combined total for both data collections was 306.

The two samples were very similar in terms of their demographic characteristics. The mean age of online participants was 27.74 ($sd=5.48$) and 26.86 ($sd=6.43$) for bridal fair participants. Both samples were primarily female. Over 78% ($n=111$) of online participants and 82.4% ($n=136$) of bridal fair participants were female. Where the samples *did* differ was in their racial composition. The online sample was 85.1% Caucasian ($n=120$), 7.1% African American ($n=10$), and 5% Asian ($n=7$), 1.4% Hispanic ($n=1$), and 1.4% indicated an “other” race ($n=1$) or choose not to answer ($n=1$). Whereas, the bridal fair sample was 58.2% Caucasian ($n=96$), 32.1% Black or African American ($n=53$), 3.6% Hispanic ($n=6$), and 3.0% Asian ($n=5$), and .6% indicated an “other” race ($n=1$).

Before making a decision to combine the online and bridal fair datasets, Mann-Whitney tests of difference (Table 3.1) were used to determine whether the samples differed in their distribution. A Bonferroni adjusted significance level was used to account for multiple tests ($p=.005$). In terms of demographics, results showed that the gender and age distributions were not significantly different. Mann-Whitney tests also showed no significant distributional differences for any of the model variables.

The only significant sample difference was for race. African Americans had higher rates of participation at bridal fairs than online. High participation rates by African Americans may be due to the make-up of individuals in the researcher’s personal network and the demographic characteristics of those who use online wedding message boards. The difference may also be reflective of the digital divide, or the belief that some groups of people have more limited access

to computers and the internet than others (Rains, 2008). Rains (2008) writes that these gaps can broaden inequality and “further disadvantage those in society who are traditionally considered have nots.” (p. 284).

Table 3.1

Mann-Whitney Tests of Difference Between Survey Samples

| Variable | <i>U</i> | <i>p</i> |
|---------------------------------|----------|----------|
| Age | 8411.00 | .02 |
| Gender | 11202.00 | .41 |
| Race | 8132.00 | .00* |
| Uncertainty Discrepancy | 9827.00 | .21 |
| Uncertainty Discrepancy Anxiety | 9487.50 | .02 |
| Information Search Anxiety | 9755.50 | .06 |
| Risk-Related Anxiety | 10594.00 | .25 |
| Communication Efficacy | 9673.50 | .08 |
| Coping Efficacy | 9480.50 | .23 |
| Direct Information Seeking | 9957.00 | .82 |

* significant difference (bonferroni adjusted $p \leq .005$)

Data from the Pew Internet and American Life Project show that, even in 2008, a gap exists. These data show that 75% of Whites have access to the internet and email versus 59% of African Americans (Fox & Vitak, 2008). This finding supports previous research showing that African Americans have lower access, particularly when taking income into account (Lorence, Park, & Fox, 2006; Wilson, Wallin, & Reiser, 2003). Research has also shown there to be differences in online behavior. African Americans were found to log-on to the internet less than Whites and spend less time working with email, browsing for fun, and getting news online

(Howard, Rainie, & Jones, 2001). Thus, it is reasonable to think that African Americans may have lower rates of participation in an online study than White participants. Because the samples were statistically different only in terms of race, the decision was made to combine the two data sets for analysis.

Main Study Procedures

Online Recruitment. After receiving IRB Approval, the main study began as a web-based study with participants recruited from online message boards. A survey website was developed and hosted at www.surveymonkey.com, a popular online survey vendor. Survey monkey allowed the user to host and create surveys online using a variety of customizable survey formats and question choices. Each survey created was also given a unique URL address that was provided to participants during recruitment so they could access the survey. Survey monkey collected survey responses in a secure online, downloadable, database.

Participants in the online group were recruited from web-based message boards and discussion groups for engaged individuals planning weddings. Many of these boards and groups are hosted on popular wedding planning websites including “The Knot,” “The Wedding Channel,” or “Martha Stewart Weddings.” Nelson and Otnes (2005) note that message boards are one of the most used tools on wedding websites. Their study of cross-cultural brides revealed that brides-to-be “used message boards to solicit advice, opinions, and information, as well as to gain emotional support, social comparison, and camaraderie” (p. 91).

An online search helped identify these groups. Terms such as “weddings,” “wedding message boards,” and “wedding planning groups” were used to locate them. Before posting to a group, permission was obtained from the group's moderator via email. It was difficult to obtain permission to post on some sites because of difficulty contacting the group’s moderator. The

moderator's information was not always updated on the sites, nor did moderators always actively moderate the boards. A total of 27 sites were identified as potential sites for posting study recruitment information and five allowed the recruitment message to be posted¹. Some moderators felt that study recruitment was an inappropriate use of the board.

After obtaining permission, a short recruitment message (Appendix C) was posted to the group. The recruitment message contained information about the study, a link to the survey website, and researcher contact information. Participants were also informed they could enter a drawing for a \$100 gift certificate from Bed, Bath and Beyond. Anyone visiting the survey website could enter the gift certificate drawing (regardless of whether they participated in the survey or not) because of laws in Georgia which prohibit entry into a drawing in exchange for survey participation.

The opening page of the survey thanked potential participants for their interest and provided a brief informational paragraph about the study. Potential participants were also asked to verify that they were age 18 or older (the study inclusion criteria). If a participant met the age criteria they were directed to a page containing an informed consent statement. After reading the informed consent statement, participants consented by checking "yes" to the statement "I understand that by completing this survey I agree to participate in this research." Participants were then directed to the survey instrument where they completed the survey online. Once participants completed the survey they were directed to the drawing entry form. Participants could also quit the survey at anytime and enter the drawing by clicking "exit this survey."

Despite the popularity of online wedding websites, posting to message boards and discussion groups yielded very few complete surveys over the course of three weeks (N=12).

¹ These sites included www.theknot.com, www.weddingchannel.com, www.bridalguide.com, www.african-americanbrides.com, and www.weddingmapper.com.

One observation is that these sites have a fairly small number of people participating on a daily or weekly basis. Brides-to-be who simply scan (as opposed to following) message boards may have missed postings about the study. Also, because weddings are short-term life events participants on the boards may come and go.

To remedy the problem of low participation, a snowball strategy was added to drive more traffic to the message boards. Friends and family of the researcher were informed via email and on Facebook (a popular online social networking site) about the study, were provided a link to the posting on The Wedding Channel website, and were asked to forward the email to people they knew who were engaged or getting married. A similar message was also posted to graduate student list-serves at the University of Georgia and Georgia Tech. Information was also posted to a marriage and family counseling list-serve and distributed to couples attending a pre-marital counseling session at the University of Georgia. Elite Events, a bridal fair planning company located near Atlanta, also provided a list of bridal fair attendees that were emailed information about the study.

Bridal Fair Recruitment. While the snowball technique did increase the sample size from 12 to 141, additional participants were desired. To reach additional brides and grooms, recruitment for the study took place at two bridal expos in the Southeastern United States -- Atlanta, Georgia and Raleigh, North Carolina. These two sites were chosen because of their proximity to the researcher, the time of year in which they were held, and because they had high attendance rates.

The survey instrument stayed the same for bridal fair participants, but the recruitment procedure was different. At each bridal fair, an exhibit space was procured to provide information, recruit participants, and conduct the research. An additional incentive (choice of a

kitchen gadget or bubble wand) was also added to increase participation in addition to the \$100 Bed, Bath and Beyond gift certificate drawing. A team of research assistants was assembled for each bridal fair to recruit brides and grooms. Potential participants were easy to identify because they wore stickers indicating they were a bride or groom. If a participant was interested in participating, the research assistant administered informed consent at the booth and the subject completed the survey on site. When the survey was completed the participant was given a debriefing form and were told to take an incentive for participating.

Limitations. While bridal fairs were good locations for recruiting engaged couples for research, there were limitations to recruiting in these locations. The first is that bridal fairs are not controlled environments. They are loud, busy, and couples often have limited time. Thus, there were many distractions for participants who completed surveys. Additionally, brides and grooms rarely came to bridal fairs alone. They came with their parents, friends, or even their own children. Because the survey took anywhere from 10-20 minutes to complete, family and friends had to wait on the participant or browse the bridal fair alone.

Family and friends who waited with the participant were sometimes distracting to the participant. They would sometimes ask the participant when they might be done or look over their shoulder. Parents were particularly a problem because they often wanted to help their children fill out the survey. To address this problem and limit potential bias, the research team actively engaged friends and family members. Parents and friends were told they could enter the drawing while the participant completed the survey. When they could, members of the research team also distracted parents and friends by engaging them in conversation so that the participant could complete the survey with more privacy.

Survey Instrument

An identical survey instrument was used online and at bridal fairs. A complete copy of the survey instrument is included in Appendix D. To determine which items to include on the survey instrument, a process was followed similar to that outlined by Netemeyer, Bearden, and Sharma (2003). The first step in designing the survey instrument was to review the literature and define each of the model constructs based on theory. The second step was development and refinement of the measures. As discussed previously, a small pilot study was conducted to assess participant responses to the measures and to learn more about the context of family health history. After a final version of the survey was complete and posted online, it was reviewed by four graduate students and timed for length (approximately 10-15 minutes). Below is a description of the survey instrument and measures for each of the study variables. Additionally, scale reliabilities and the results of confirmatory factor analysis are reported.

Determining scale reliabilities and dimensionality. While Cronbach's Alpha is the most popular way to assess the reliability of scales, it does not confirm whether a scale is truly unidimensional (Netemeyer et al., 2003). Thus, confirmatory factory analysis (CFA) was also used to confirm the hypothesized dimensionality of the measures. Correlations between survey items are reported in Table E.1 in Appendix E. Spearman rho correlations were used because some variables exhibited deviations from normality. A CFA was first used to finalize the scales, to identify problematic items, and to confirm scale structure (Netemeyer et al., 2003). Cronbach's Alphas were also computed for each composite measure to determine scale reliability. Scales with reliabilities below .70 were investigated to determine whether dropping one or more items might improve the reliability of the score (as recommended by Nunnally,

1978). Once the unidimensionality and the reliability of the items was confirmed, they were summed to form composite variables.

Prior to CFA, the data were screened following recommendations by Kline (2005) to ensure they met the requirements or assumptions for CFA. Multivariate normality was first assessed. Many of the variables exhibited some degree of non-normality, but the skewness and kurtosis values fell within the acceptable range. Kline (2005) recommends a cut-off value of $|3|$ for skewness and $|8|$ and kurtosis. Skewness and kurtosis values in this study were below $|2|$ with the exception of two avoidance items, but both of these items fell below the Kline (2005) recommendations. There did not appear to be outliers in the data. Missing data (less than 10% for each measure) were dealt with by listwise deletion in Lisrel.

Multi-collinearity, the existence of high correlations between items, was also assessed. Kline (2005) suggests r -values not larger than .85. Highly correlated items can artificially inflate the alpha level and may indicate that the wording of two items is similar (Netemeyer et al., 2003). An examination of the inter-item correlations (Appendix E) showed multi-collinearity was a problem among measures of communication efficacy, issue importance, and outcome expectancies. As a result, some of the items designed to measure these constructs were dropped from the analysis. These items are indicated on Table E.1 in Appendix E.

The “factors” in CFA models represent TMIM model variables (anxiety, efficacy, etc.). The “indicators” that load on each factor are single survey items. Figure 3.1 is an example of a four-factor CFA model. Confirmatory factor analyses were conducted in Lisrel 8.52 (Joreskog & Sorbom, 2002) from covariance matrices. Multi-factor models were tested rather than individual one-factor models to increase model degrees of freedom and to ensure that all the models were identified (meaning they contain at least as many observations as parameters). Several of the one

factor models had only 2 or 3 indicators, meaning they would be under or just identified (containing exactly the same number of parameters and observations). Models that are under identified or just identified are problematic in CFA as the models may not run. Models were tested to verify the unidimensionality of the measures for anxiety, efficacy, and direct information seeking.

For each factor, the unstandardized loading of the first indicator variable was set to 1.0 (as recommended by Kline, 2005; see Figure 3.1). In each model, the factors were allowed to correlate and the maximum likelihood method of estimation was used. Measures of model fit that were used included chi-square, root mean square error approximation (RMSEA), Comparative Fit index (CFI), and the standardized mean square residual (SRMR). Hu and Bentler (1999) recommend cut-off values of close to .06 for RMSEA, close to .95 for CFI, and close to .08 for SRMR. Browne and Cudeck (1993) suggest that values of RMSEA may even be as high as .08. Several fit indices supplement chi-square because it is often not a good indicator of model fit (Kline, 2005). After assessing model fit, the factor loadings were examined. To assess significance, the t-test statistic for each factor loading was examined to determine whether the factor loading was significantly different from 0. Netemeyer et al.(2003) recommends that the t-statistic have a value of greater than 2.57 when there are at least 5 degrees of freedom ($p=.05$), which was the criterion used here.

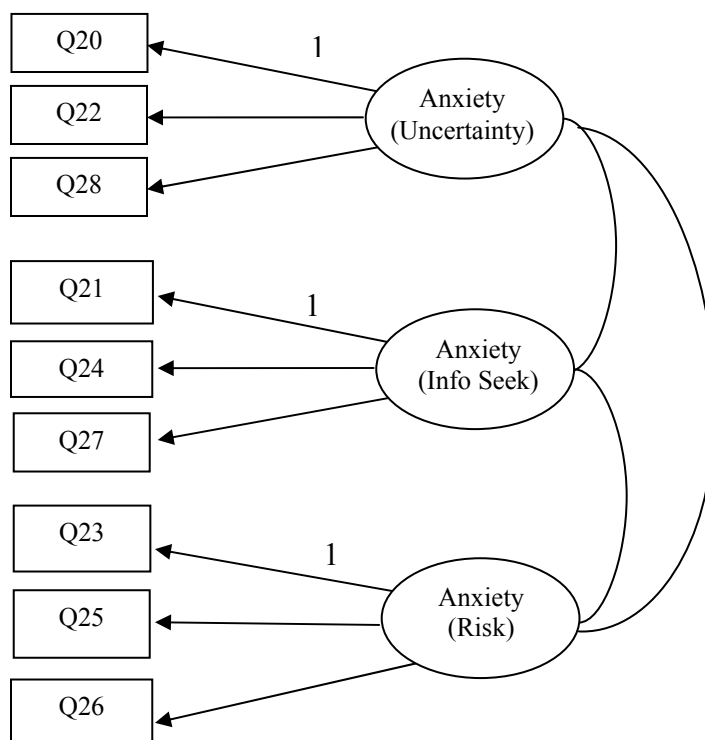


Figure 3.1: Example CFA model.

Survey Items

Uncertainty Discrepancy. Uncertainty discrepancy represents the difference between individuals' current and desired level of certainty about their family health history. One way to assess uncertainty discrepancy is to subtract current knowledge about a topic from desired knowledge, with the gap representing the uncertainty discrepancy (Afifi, Dillow, & Morse, 2004; Afifi & Weiner, 2006). The subtraction of current from desired knowledge results in a positive number when a discrepancy exists and a zero when a discrepancy does not exist. The negative scores represent a relative excess of information. To increase the reliability of the subtracted uncertainty measure, two or three single items are often added to this subtracted score. The single items assess whether participants desire more information than they have and after confirming their reliability are added to the subtracted score to create an uncertainty discrepancy

index. Afifi and Weiner (2006) suggest this cumulative technique provides a more comprehensive measure of uncertainty discrepancy than one technique alone.

The present study measured uncertainty discrepancy in the same way. Current knowledge was subtracted from desired knowledge with the gap representing the discrepancy. Two additional items measuring uncertainty discrepancy were also assessed on a 1 (strongly disagree) to 7 (strongly agree) scale with the intention of adding them to the subtracted score. The first item asked participants to assess their agreement with the statement “I want to know more than I currently know about my family health history.” The second statement was “I am not as certain as I would like to be about my family health history.” This cumulative method of measuring uncertainty discrepancy is problematic, however. The first problem is that negative numbers produced from the subtraction technique make little sense in the TMIM model. Negative scores represent an overabundance of information, which the model suggests is not anxiety-provoking nor motivating in the model. The second problem is that many of those who reported negative scores had correspondingly low scores on the likert-scaled items, making them problematic on the lower end of the scale. Therefore, the single subtracted score was used in the analysis, with negative scores excluded.

Anxiety. Three sources of anxiety were measured in this study related to (a) the perception of family health history risk, (b) information seeking, and (c) uncertainty discrepancy. Measures of anxiety used by Afifi and colleagues in past TMIM research ($\alpha \geq .84$) were used, but modified slightly to measure additional sources of anxiety. A 3-item measure was used for each type of anxiety. Participants were asked to state their level of agreement with three statements on a 1 (strongly disagree) to 7 (strongly agree) scale. After confirming the

dimensionality and reliability of the items for each type of anxiety, the items were summed to create composite variables.

The items measuring uncertainty discrepancy-related anxiety included: (a) It makes me anxious to think about how little I know, compared to what I would like to know, about my family health history, (b) Not having as much information about my family health history as I would like makes me worried, and (c) The gap between how much I know and how much I would like to know about my family health history makes me nervous. Items used to assess risk-related anxiety included: (a) I feel anxiety about my family health history because there is a chance I might be at risk for a disease, (b) Thinking I could be at risk for a disease because of my family health history makes me nervous, and (c) I am worried about my health because of my family health history. Measures of information search anxiety included: (a) Talking to my family about our health history makes me nervous, (b) The thought of talking to family members about health history makes me worried, and (c) I have some anxiety about talking to my family about family health history.

A three factor CFA model was run to determine the unidimensionality of items measuring each source of anxiety. The model exhibited an acceptable level of fit ($\chi^2(24) = 67.99$ ($p = .00$), RMSEA = .08, CFI = .98, SRMR = .04). While the fit indices do not indicate an extremely close fit, they do suggest the items exhibit a three factor structure. Parameter estimates are reported in Table 3.2. Parameter estimates for each source of anxiety were also acceptable. The R-square values were high which indicates a large amount of the item variance was accounted for by the factors. While the correlations among the four factors were somewhat high (ranging from .60 to .75), they are below the a .90 cut-off suggested by John and Benet-Martinez (2000) that is used here. Correlations between factors are of concern because highly correlated factors

can indicate substantial factor overlap and a lack of independence among items (John & Benet-Martinez, 2000). Cronbach's Alpha for uncertainty discrepancy-related anxiety was .83, for risk-related anxiety was .81, and for information search anxiety was .89.

Outcome Expectancy. Outcome expectancies capture participants' expectations or assessments of an information search. Afifi et al.'s (2006) organ donation study measures were used because they were most relevant to the family history context. A two-item index was used to measure the expected positive outcomes relative to the negative outcomes from talking with family members on a -3 (a lot more negatives than positives) to 3 (a lot more positives than negatives) scale. These two items exhibited multi-collinearity with an inter-item correlation of .93 (see Appendix E). Therefore, a one-item measure of outcome expectancy was used. The measure asked participants to assess the ratio of positives to negatives that would be produced from asking family members about health history.

Issue Importance. As with outcome expectancies, measures of issue importance were taken from the Afifi et al. (2006) organ donation study. Two measures were used to measure issue importance including (a) It is important to me that I know my family health history and (b) It is important to me that I discuss family health history with my family. The items were measured on a 1 (strongly disagree) to 7 (strongly agree) scale. As with outcome expectancies, the two items were highly correlated ($r=.89$) and above Kline's (2005) recommended cut-off value of .85. Therefore, only the first item was retained. It was retained because it aligned most closely with the definition of issue importance used in this study.

Table 3.2

CFA Model Parameter Estimates

| Measures | Unstandardized | | | Standardized | |
|------------------------|----------------|-----|--------|--------------|----------------|
| | loading | SE | t | loading | R ² |
| Model 1 | | | | | |
| Anxiety - UD | | | | | |
| Q20 | 1 | – | a | .75 | .56 |
| Q22 | 1.11 | .09 | 12.57* | .78 | .61 |
| Q28 | 1.03 | .08 | 13.21* | .83 | .69 |
| Anxiety - Info Search | | | | | |
| Q21 | 1 | – | a | .85 | .72 |
| Q24 | .99 | .06 | 17.33* | .85 | .72 |
| Q27 | 1.00 | .06 | 17.79* | .87 | .76 |
| Anxiety - Risk Related | | | | | |
| Q23 | 1 | – | a | .75 | .57 |
| Q24 | 1.14 | .09 | 13.04* | .84 | .71 |
| Q27 | 0.88 | .08 | 11.50* | .72 | .51 |

(table continues)

Table 3.2 (continued)

CFA Model Parameter Estimates

| Measures | Unstandardized | | | Standardized | |
|----------------------------|----------------|-----|----------|--------------|-----------------------|
| | loading | SE | <i>t</i> | loading | <i>R</i> ² |
| Model 2 | | | | | |
| Communication Efficacy | | | | | |
| Q36 | 1 | – | a | .71 | .51 |
| Q38 | 1.03 | .08 | 13.57* | .84 | .71 |
| Q40 | .99 | .07 | 14.33* | .89 | .80 |
| Q37 | 1.02 | .08 | 12.73* | .79 | .62 |
| Q42 | 1.01 | .08 | 12.75* | .79 | .63 |
| Q39 | .84 | .07 | 11.59* | .72 | .52 |
| Coping Efficacy | | | | | |
| Q43 | 1 | – | a | .63 | .40 |
| Q47 | 1.33 | .16 | 9.16* | .75 | .58 |
| Q49 | 1.15 | .13 | 8.96* | .72 | .52 |
| Q53 | 1.14 | .19 | 8.22* | .63 | .40 |
| Model 3 | | | | | |
| Direct Information Seeking | | | | | |
| Q56 | 1 | – | a | .92 | .85 |
| Q60 | 1.33 | .06 | 22.81* | .88 | .78 |
| Q63 | 1.29 | .06 | 23.41* | .89 | .80 |

^a= not tested for significance, ^b=questions are listed in Appendix D, * statistically significant factor loading ($p < .01$)

Efficacy. Efficacy refers to confidence in one's ability to directly communicate.

It is hypothesized to be a latent construct comprised of communication, coping, and target efficacy. Items measuring each form of efficacy are reported below. A multi-factor CFA was then run to determine whether the items loaded significantly on their respective factors. To assess reliability, Cronbach's Alpha was calculated for each set of items.

Target Efficacy. Target efficacy refers to an information source's ability and willingness to provide complete information about family health history. Target efficacy includes measures of (a) target ability (whether the target has access to the information) and (b) target honesty (confidence in the target's willingness to provide all information). Target efficacy measures used in the sexual health study (Afifi & Weiner, 2006) were shown to be the most reliable for measuring target ability ($\alpha=.71$), while the measures used in the close relationships study (Afifi et al., 2004) are reliable for measuring target honesty ($\alpha =.84$). Target efficacy items asked participants to state their level of agreement with statements on a 1 (strongly disagree) to 7 (strongly agree) scale. Measures of target ability included (a) My family can provide me with information about our family health history and (b) My family has complete information about our family health history. Measures of honesty included (a) My family would be completely honest about our family health history and (b) My family would tell me everything they know about our family health history.

Coping Efficacy. Coping efficacy is defined as the extent to which people believe they can cope with positive and negative communication outcomes. Measures of coping efficacy in the past have measured only the extent to which people believe they can cope with *negative* information, despite the fact that many people do not expect the information they receive will be negative (Afifi et al., 2004; Afifi et al., 2006). As a response to these problems, Afifi and

colleagues have designed new measures of coping efficacy. These measures have not been published, but were used in an unpublished study on parental care giving (Afifi, 2008). The measures ask individuals to imagine how they might cope with *both* positive and negative outcomes of direct information seeking (i.e. “Imagine that a family member became upset...” or “Imagine your conversation goes so well that...”).

Six items were used to measure coping efficacy on a 1 (could not cope) to 7 (could cope perfectly well) scale. Four items measuring negative outcomes asked participants to imagine how well they would cope if a family member became upset, if family health information had been kept from them, if they found out they were at risk for a disease, or if they discovered their family knew nothing about family health history. Two items measuring positive outcomes asked participants to imagine how they would cope if family members offered to help and also how well they would cope if they discovered family health history information had already been recorded. Because the measures had not been used in a published study, it was not clear whether positive and negative coping efficacy comprised a one coping efficacy factor or if they formed two separate factors. To test these alternatives, exploratory factor analysis was used. Exploratory Factor Analysis (EFA) is preferred to CFA when there is not a clear hypothesis. It is also used in scale development to reduce the number of items in a scale and to identify the underlying dimensions of a scale (Netemeyer et al., 2003). A principal components analysis (PCA) with a varimax rotation was conducted in SPSS. The criteria for extracting factors was an eigenvalue greater than 1 (Netemeyer et al., 2003).

The PCA showed two components, a negative coping efficacy factor and a positive coping efficacy factor. The negative coping efficacy component explained 47.59% of the total variance while the positive coping efficacy component explained only 19.4% of the variance.

Because the variance explained by the coping efficacy items was low, and for the sake of simplicity, these items were dropped. Dropping the positive efficacy items increased the percentage of variance explained to 60%. The factor loadings for negative coping efficacy items ranged from .75 to .81. Cronbach's Alpha was .78, indicating the measures were reliable.

Communication efficacy. In previous tests of the TMIM, measures of communication efficacy have been reliable ($\alpha \geq .74$). This study used four context-relevant items from previous studies (Afifi et al., 2004; Afifi & Weiner, 2004, 2006). Participants were asked to indicate their level of agreement with statements asking whether they (a) know how to talk to their family about family health history, (b) know what to say to get the information, (c) can ask family members about it, and (d) are confident they can approach family members to talk about health history. The items were measured on a scale from 1 (strongly disagree) to 7 (strongly agree).

Inter-item correlations showed that the first two items (a and b) were highly correlated ($r=.89$), probably because the wording of the items was similar ("I know how to talk" versus "I know what to say"). Because of the potential problems due to multi-collinearity, a decision was made to drop the first item (dropping this item had the least effect on Cronbach's Alpha). Confirmatory factor analysis was then used to test the 4-factor structure of efficacy (target ability, target honesty, coping efficacy, and communication efficacy). The model provided a marginally adequate fit to the data ($\chi^2(38)=131.99$ ($p<.01$), RMSEA=.09, CFI=.97, SRMR=.05). The communication efficacy factor was also highly correlated with target honesty ($r=.95$) and target ability ($r=.80$), indicating the factors may not be unique (Kline, 2005).

Closer examination of the items reveals their similarity. Both sets of items assess confidence or ability to communicate to obtain desired information, but the source of the communication varies. Communication efficacy reflects an *individual's* ability to communicate

to obtain needed information, while target efficacy deals with their *family's* ability to communicate the needed information. There is likely some level of dependency between the two terms. Specifically, the level of confidence one has in their ability to communicate with their family may depend on how they anticipate their family will respond. Thus, it not unreasonable to think that the items may load on one global communication efficacy factor.

To determine if this was the case, an EFA was run to test whether communication and target efficacy items loaded on one communication efficacy factor. An EFA was conducted using principal components analysis following the same criteria outlined previously (Table 3.3). The EFA showed that seven items loaded on a single communication efficacy factor and accounted for over 65% of the variance ($\alpha=.91$). A two-factor CFA model was then tested containing communication and coping efficacy factors. The model exhibited a poor fit ($\chi^2 (43)=211.13$ ($p<.00$), RMSEA=.11, CFI=.94, SRMR=.06). One of the factor loadings (Q41) had an R-square value of .39, which was lowest among the items. This same item also exhibited the lowest rotated factor loading in the EFA tested previously (Table 3.3). To determine whether dropping the one item might improve the model fit, an EFA was run again with the item dropped. Dropping this factor increased the total variance explained from 65.5% to 70%. The remaining 6-items exhibited high reliability ($\alpha = .91$), so the items were retained as indicators of communication efficacy and the CFA model respecified and tested.

Table 3.3

Communication Efficacy Factor Loadings

| Question | Item | Factor loading |
|----------|---|----------------|
| Q36 (CE) | I know what to say to get health history information from my family. | .77 |
| Q37 (TH) | My family would be completely honest about our family health history. | .82 |
| Q38 (CE) | I am able to ask my family about health history. | .85 |
| Q39 (TA) | My family can provide me with information about my family health history. | .82 |
| Q40 (CE) | I am confident I can approach members of my family to talk about family health history. | .90 |
| Q41 (TA) | My family has complete information about our family health history. | .70 |
| Q42 (TH) | My family members would tell me everything they know about our family health history. | .82 |

CE = Communication Efficacy Measures, TH=Target Honesty Measures, TA =Target Ability Measures

The CFA model fit was improved (χ^2 (34)=129.52 ($p<.00$), RMSEA=.09, CFI=.96, SRMR=.05), but could still not be characterized as having an excellent fit to the data. The fit was adequate at best. Parameter estimates for this final model are reported in Table 3.2. The parameter estimates for each factor were also significant and standardized loadings were in the acceptable range. The correlation between communication and coping was .30, indicating

multicollinearity was no longer a problem. The R-square values were also in the range of .40 to .80 which indicates the items explain a fairly large amount of the variance. As a result, the items comprising each factor were summed, creating a composite communication efficacy variable and composite coping efficacy variable.

A hierarchical CFA model would normally be tested to determine whether communication and coping efficacy (and their measures) were indicators of a latent efficacy construct as the model predicts. However, it was not possible to test this model. The second-order factor efficacy had only two first-order indicators (communication and coping efficacy), leaving the model under-identified. Because the unidimensionality of efficacy could not be confirmed, communication and coping efficacy were entered separately in models that included efficacy. This decision was strengthened by the fact that communication and coping efficacy were weakly correlated ($r=.29$), which suggests the two types of efficacy are separate constructs.

Intention to Directly Seek Information. Direct information seeking was the only information management strategy tested in this study. Measures of indirect information seeking and avoidance were both problematic. Avoidance measures exhibited high skewness and kurtosis values (2.29 and 5.54, respectively) and 77% of people had an overall mean avoidance score of 2 or less on a scale of 1-7, indicating strong disagreement with avoidance strategies. Conceptually it would have made little sense to examine the intention to use avoidance strategies if hardly any participants intended to use the strategy. Measures of indirect information seeking were plagued by measurement error and were not reliable. The items were weakly correlated and did not come close to meeting minimum reliability standards. The response distributions were also not consistent across items (two items were negatively skewed while one was positively skewed).

Additionally, the items did not directly ask participants if they would seek information indirectly and instead asked if participants would use strategies that might be considered indirect.

Three items measured intention to directly seek information. Participants were asked to state their level of agreement (1=strongly disagree and 7=strongly agree) with statements assessing how they would talk about health history with their families. Direct information seeking items included (a) I would ask my family directly, (b) I would question my family outright or ask for information directly, and (c) I would directly approach my family to talk about it. To determine the dimensionality of the direct information seeking items, confirmatory factor analysis was used. Because a one-factor CFA model of direct information seeking would have been just-identified it was tested in a model with its direct predictor, uncertainty discrepancy anxiety. This choice increased the model degrees of freedom. The two-factor model did not exhibit an excellent fit ($\chi^2(8)=36.14$ ($p=.000$), RMSEA=.11, CFI=.98, SRMR, =.05), although the CFI and SRMR indexes do indicate some semblance of fit. Because the parameter estimates for uncertainty discrepancy anxiety were reported previously, only the parameter estimates for direct information seeking are reported in Table 3.2. The parameter estimates for direct information seeking items were significant and the standardized loadings were very high, which indicates a good fit. The R-square values also indicate a high proportion of explained variance. Additionally, the correlation between the two factors (anxiety and direct information seeking) was low ($r=-.27$) which illustrates their independence. Cronbach's alpha also showed the measures of direct information seeking to be very reliable ($\alpha=.87$).

Family Health History Measures. In addition to measures of TMIM variables, items were also included on the survey to assess family communication about health history. Two questions were analyzed in this dissertation. The first asked participants to identify situations (all that

applied) which prompted family discussions about family health history. Answers included such things as health problems, death, pregnancy, genetic tests, marriage, family gatherings, a news story, family member asking about it, or an “other” response. The second question asked participants to identify who they would approach first, second and third to discuss family health history. Participants could pick from a list of responses including mother, father, grandparents, great grandparents, aunts, uncles, and cousins.

Data Analysis

Data Preparation and Screening

Before conducting data analysis, the summed composite variables tested in the model were screened for multicollinearity and univariate normality (as suggested by Kline, 2008). Table 3.4 reports the spearman rho correlations between model variables. Spearman Rho was used over Pearson correlations because it is robust to non-normality. The variables were only moderately correlated, indicating multicollinearity was not a problem.

The composite variables were also screened for normality, looking first at the distributions. Uncertainty discrepancy and coping efficacy had close to normal distributions while the rest exhibited some degree of positive or negative skew. Outcome expectancy, issue importance, risk related anxiety, and communication efficacy were not transformed but were within an acceptable range for skewness and kurtosis values. A cut-off value was used for the composite variables with a preference for skewness and kurtosis values in the range of 0-2, though all the values fell well below the threshold. Information search anxiety exhibited the highest values for skewness (1.27) and kurtosis (1.20). Transformations were attempted but generally did not correct non-normality among these variables, with one exception. A square root transformation was used successfully with the uncertainty discrepancy anxiety variable.

Table 3.4

Spearman Rho Correlations Between Non-Transformed Model Variables

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---------------------------------|---|-----|------|------|-------|-------|-------|-------|-------|
| 1. Uncertainty Discrepancy (UD) | – | .38 | .03 | .15 | .15 | .03 | -.24 | -.09 | .03 |
| 2. Anxiety -- UD | | – | 0.54 | 0.61 | 0.12 | -0.10 | -0.36 | -0.34 | -0.23 |
| 3. Anxiety -- Info Search | | | – | 0.51 | -0.16 | -0.31 | -0.48 | -0.29 | -0.47 |
| 4. Anxiety - Risk | | | | – | 0.16 | -0.13 | -0.21 | -0.31 | -0.22 |
| 5. Issue Importance | | | | | – | 0.38 | 0.24 | -0.03 | 0.22 |
| 6. Outcome Expectancy | | | | | | – | 0.35 | 0.16 | 0.27 |
| 7. Communication Efficacy | | | | | | | – | 0.26 | 0.48 |
| 8. Coping Efficacy | | | | | | | | – | 0.19 |
| 9. Direct Information Seeking | | | | | | | | | – |

The direct information seeking variable did exhibit high skewness and kurtosis values (skewness=4.09, kurtosis=.14). While the variable could be observed over its entire range of values there were high numbers of individuals clustered at the highest end of the scale (21), which suggests that variable was censored. It could also not be successfully transformed, despite trying a variety of transformations. Because of the censored nature of the data, tobit regression was used when testing predictors of direct information seeking. Tobit regression provides a more consistent estimate of the parameters and takes into account information about the censoring (Long, 1997). Additionally, in tobit regression the coefficients can be decomposed into marginal and linear effects (Shen and Bigsby, in press). Because direct information seeking is censored at the upper level, marginal effects refer to the effect of a change in the independent variable on the probability of an individual being below the direct information seeking upper threshold of 21 (McDonald and Moffitt, 1980; LeClere, 1994). The linear effect refers to the change in the value of direct information seeking per one unit increase in the independent variable, below the threshold of 21 (McDonald and Moffitt, 1980; LeClere, 1994; Shen and Bisgby, in press).

Model Testing

The model tested in this study is an example of what Preacher, Rucker and Hayes (2007) define as “moderated mediation” or a model having conditional indirect effects. In other words, the variable in the model that mediates (anxiety) is also being moderated by other variables (efficacy, issue importance, outcome expectancy). As Figure 3.2 shows, path *a* from uncertainty discrepancy (X) to the mediator anxiety (M) is constant while the path *b* from anxiety (M) to information management (Y) is moderated by efficacy (Z1 and Z2), issue importance (Z3), and outcome expectancy (Z4). Thus, the mediation effect caused by anxiety in the model varies in strength depending on the values of the moderators (Preacher et al., 2007).

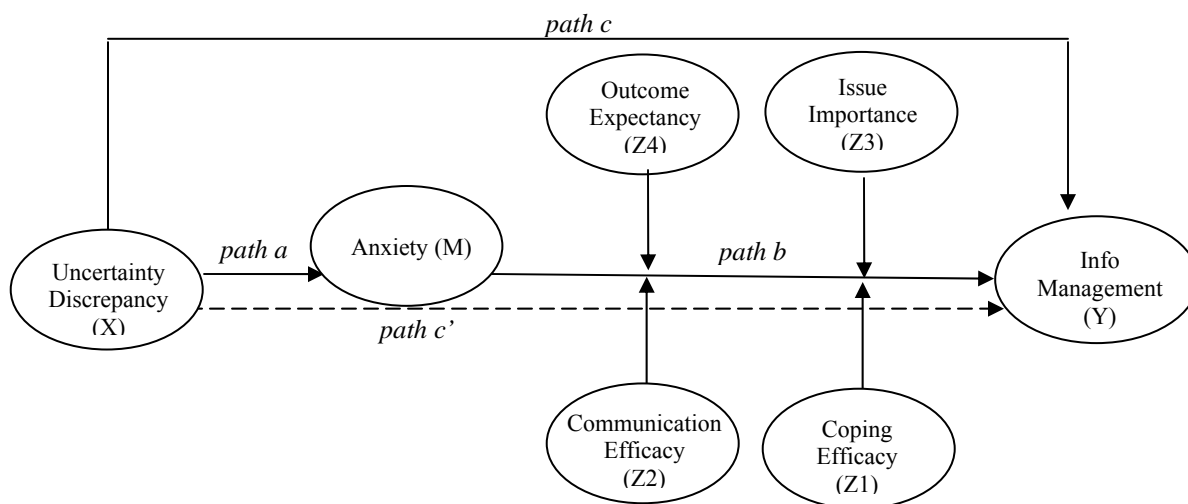


Figure 3.2: Hypothesized model with tested paths.

To test the model, Ordinary Least Squares (OLS) and tobit regressions were conducted in SPSS 16.0 and STATA 10. The MODMED (Preacher, Rucker, & Hayes, 2008) and INDIRECT macros (Preacher & Hayes, 2009) for SPSS were also used to assess the indirect effects of uncertainty on direct information seeking through anxiety. Regression techniques outlined by Baron and Kenny (1986) were first used to test the individual paths in the model. Procedures outlined by Preacher and Hayes (2004), Preacher et al. (2007), Preacher and Hayes (2008) were used to test the indirect and conditional indirect effects.

As outlined by Kenny (2008) and Baron and Kenny (1986), the first step in assessing mediation is to confirm that anxiety mediates the relationship between uncertainty discrepancy and information seeking. Linear and tobit regressions were used to test paths *a*, *b*, and *c* in the model (Figure 3.2). The purpose of testing all three paths separately was to confirm the existence of relationships between the variables. The second step was to determine whether uncertainty discrepancy remained a significant predictor of information management when controlling for anxiety (path *c'*). Multiple tobit regression was used to test this hypothesis. Significance of this

path suggests partial mediation while non-significance suggests full mediation (when path c is also significant).

To understand the extent to which a variable mediates, an indirect effect is calculated. The indirect effect confirms the indirect effect of an independent variable on a dependent variable through the mediator. The indirect effect is essentially calculated by subtracting path c' (the direct effect) from path c (the total effect, Kenny, 2008). The indirect effect was tested in the present study by using a bootstrapping approach outlined by Preacher and Hayes (2004). This non-parametric approach was chosen over the traditional Sobel test, because it does not assume a normal distribution (Preacher and Hayes, 2004)

To test the moderation predictions, interaction terms were created by multiplying anxiety by each of the proposed moderators. Paths b and c' were then tested again sequentially to determine the effects of moderators. Conditional indirect effects were also calculated using a bootstrapping approach to determine whether the indirect effects of a moderator were significant across various levels of that moderator (Preacher et al., 2008).

Model Comparison

As a final step in analyzing the revised model, the original TMIM model was also tested. The goal of this analysis was to understand how well the revised TMIM model performed relative to the original model specified by Afifi and Weiner (2004). The original TMIM model (Figure 2.1) can be thought of as a multiple mediator model (Preacher & Hayes, 2008) or double-mediation model (Scholten & Sherman, 2006). There were no moderation predictions in the original model, but several mediation predictions. The specific mediation predictions included: (a) anxiety is a partial mediator of the relationship between uncertainty discrepancy and direct information seeking, (b) outcome expectancies and efficacy partially mediate the relationship

between anxiety and direct information seeking, and (c) efficacy is a partial mediator of the effects of outcome expectancies on information management (Afifi and Weiner, 2004).

This test of the original TMIM model was conducted using multiple tobit regressions, as outlined by Menard et al. (2003). Structural equation modeling is typically used to assess the fit of the TMIM, but regression was used here to be consistent with the data analysis in this study. A series of regressions were conducted entering the predictors of direct information seeking sequentially to test for mediation. Specifically, 5 models were tested and variables were entered in the following order (closest to direct information seeking first): efficacy (step 1), outcome expectancy (step 2), uncertainty-related anxiety (step 3), and uncertainty discrepancy (step 4). Because the two forms of efficacy previously failed to form one latent construct, models were tested separately for coping efficacy and for communication efficacy as in Afifi and Weiner (2006). Finally, indirect effects were assessed using bootstrapping methods outlined by Preacher and Hayes (2008).

Family Health History Measures

Descriptive statistics were primarily used to analyze questions related to (a) when families communicate about family health history and (b) whom individuals approach first to discuss family health history. To answer the question of whether there were gender differences in the way participants managed information (RQ3), Mann-Whitney tests of difference were used to assess differences across each of the TMIM variables. Non-parametric Mann-Whitney tests were used because of the non-normality exhibited by the direct information seeking variable. This technique is the same used by Afifi et al. (2006) to examine racial differences in attitudes towards organ donation.

CHAPTER 4

RESULTS

Descriptive statistics were calculated for each of the model variables. Table 4.1 reports raw means and standard deviations prior to transformation or standardization. An examination of the means shows the existence of uncertainty discrepancies, low to moderate levels of anxiety, and high intention to use direct information strategies. Participants also reported high levels of efficacy, positive outcome expectancies, and high issue importance for family health history.

Table 4.1

Values, Raw Means and Standard Deviations of TMIM Model Variables

| Variable | Minimum | Maximum | <i>M</i> | <i>SD</i> | <i>N</i> |
|---------------------------------|---------|---------|----------|-----------|----------|
| Uncertainty Discrepancy * | 0 | 6 | 1.80 | 1.25 | 293 |
| Uncertainty Discrepancy Anxiety | 3 | 21 | 9.17 | 4.24 | 301 |
| Risk Related Anxiety | 3 | 21 | 10.19 | 4.70 | 304 |
| Information Search Anxiety | 3 | 21 | 6.85 | 4.17 | 300 |
| Communication Efficacy | 10 | 42 | 34.78 | 7.25 | 297 |
| Coping Efficacy | 6 | 28 | 18.24 | 5.06 | 289 |
| Outcome Expectancy | 1 | 7 | 5.55 | 1.40 | 297 |
| Issue Importance | 1 | 7 | 5.82 | 1.34 | 304 |
| Direct Information Seeking | 3 | 21 | 17.56 | 4.09 | 286 |

* positive numbers indicate discrepancies

Test of the Revised TMIM Model

Hypothesis 1

Hypothesis 1 proposed that uncertainty discrepancy about family health history would lead to the production of uncertainty-related anxiety (uncertainty discrepancy → anxiety; path *a* in Figure 3.2). A linear ordinary least squares (OLS) regression was used to verify this hypothesis. Uncertainty discrepancies were shown to increase anxiety ($\beta=.23$, $t(286)=7.43$, $p<.01$). Additionally, uncertainty discrepancy explained nearly 16% of the variance in anxiety ($R^2=.16$). Thus, hypothesis 1 was supported.

Hypothesis 2

Hypothesis 2 proposed that uncertainty-related anxiety would predict intention to directly seek information about family health history (anxiety → direct information seeking; path *b* in Figure 3.2). Because direct information seeking was a censored variable (meaning several observations were clustered at the upper level of the scale at 21), tobit regression was used to test hypothesis 2. Because tobit regression uses a maximum likelihood estimation instead of ordinary least squares, a maximum likelihood ratio chi-square test was used to indicate model fit.

Additionally, in tobit regression pseudo R-square values are calculated rather than traditional R-square values. Pseudo R-square values were designed to approximate R-square variance explained, but they should be interpreted with caution and used mostly to compare model fits (UCLA, 2009). Because the McKelvey-Zavonia pseudo R-square has been shown to be the best estimator of explained variance (DeMaris, 2002) and has a range of 0-1 (UCLA, 2009), it was used in the present study.

Results showed uncertainty-related anxiety to be a significant predictor of intention to direct information seek ($\beta = -1.94$, $t(280)=-3.51$, $p<.01$). The negative coefficient suggests direct

information seeking goes up as anxiety goes down. Thus, hypothesis 2 was supported. However, the pseudo R-square value ($R^2 = .05$) suggests anxiety may not explain much of the variance in direct information seeking. Decomposition of the tobit coefficients shows a linear effect of $-.82$, which suggests that below the upper threshold of direct information seeking scores (values < 21) a one unit increase in anxiety decreases direct information seeking by $.82$. Additionally, a marginal effect of $.12$ suggests that with a one unit increase in anxiety there is a 12% greater probability that the direct information seeking score will fall below the threshold value of 21.

Because the pseudo R-square value for the model was low, two additional sources of anxiety were added to the model post hoc to determine whether the value of the pseudo R^2 would increase. These two sources of anxiety were information search anxiety (anxiety about the process of searching for family health information) and risk-related anxiety (anxiety individuals have about their own level of risk because of family health history). The model with all 3 types of anxiety had a substantially higher pseudo R-square value ($R^2 = .17$). However, the only significant term in the model was information search anxiety ($\beta = -.64$, $t(276) = -6.10$, $p < .01$). The linear effect of information search anxiety was $-.28$ and the marginal effect was $.04$. These effects mirror the negative effect of uncertainty-related anxiety on direct information seeking below the upper threshold, but to a lesser extent.

Hypothesis 3

Hypothesis 3 predicted that uncertainty-related anxiety would partially mediate the relationship between uncertainty discrepancy and intention to direct information seek. Testing this hypothesis required two steps. The first step was determining whether the independent variable significantly predicted the dependent variable (uncertainty discrepancy \rightarrow direct information seeking, path c in Figure 3.2). The second step was determining whether the

independent variable significantly predicts the dependent variable when controlling for the mediator (uncertainty discrepancy \rightarrow anxiety \rightarrow direct information seeking, path c' in Figure 3.2).

Using tobit regression, the first model tested whether uncertainty discrepancy predicted intention to directly seek information. Uncertainty discrepancy was not a significant predictor of direct information seeking ($\beta = .28$, $t(272)=.86$, $p=.39$). The linear effect was .12 and the marginal effect was -.02. The second model tested whether uncertainty discrepancy predicted direct information seeking when controlling for anxiety. Results showed that both uncertainty discrepancy ($\beta = .79$, $t(269)=2.27$, $p=.02$) and uncertainty-related anxiety ($\beta = -2.57$, $t(269)=-4.18$, $p=.00$) were significant. However, the pseudo R-square value suggests that the model accounts for minimal variance in direct information seeking and is not a significant improvement over previously tested models ($R^2 = .07$). The linear effect of uncertainty discrepancy was .34, which suggests that a one unit increase in uncertainty discrepancy leads to a .34 increase in direct information seeking below the upper threshold of 21. The marginal effect of uncertainty discrepancy at -5% suggests that with a one unit increase in uncertainty discrepancy there is a 5% lower probability that the direct information seeking score will fall below the threshold. The linear effect of uncertainty-related anxiety was -1.09 and the marginal effect was .17. While the linear effect was larger than in past tests, these results mirror previous findings of the negative effect of anxiety on direct information seeking.

Because the pseudo R-square values were so low, information search anxiety and risk related anxiety were added again to the model as covariates post hoc. Again, the effect of information search anxiety was strong ($R^2 = .20$). Information search anxiety was shown to be the only significant predictor of direct information seeking ($\beta = -.66$, $t(265)=-6.13$, $p=.00$). Similar to

previous findings, decomposition of the information search anxiety coefficient shows a linear effect of $-.29$ and a marginal effect of $.04$.

The fact that uncertainty discrepancy was not significant suggests that information search anxiety does not act as a mediator of the relationship between uncertainty discrepancy and direct information seeking intention in the same way that uncertainty-related anxiety does. Theoretically one would not expect information search anxiety to be the *outcome* of an uncertainty discrepancy and a separate linear regression confirmed that uncertainty discrepancy does not predict information search anxiety ($\beta = .09$, $t(286) = .42$, $p = .67$, $R^2 = .001$).

Analyses conducted thus far to test hypothesis 3 have shown that uncertainty discrepancy is not a significant predictor of direct information seeking (path *c*). This finding suggests that the criterion for partial mediation was not met, and thus, hypothesis 3 was not confirmed. However, some researchers have begun to question the requirement that path *c* be significant and have offered an alternative explanation for why this might occur (MacKinnon, 2000). One explanation for why the path from uncertainty discrepancy to direct information seeking was not significant is because the model exhibited inconsistent mediation, which implies that at least one mediated effect has a different sign than the others (Davis, 1985; cited by MacKinnon, Fairchild, & Fritz, 2007; MacKinnon, Krull, & Lockwood, 2000). In the present model, the relationship between uncertainty discrepancy and anxiety was positive while the relationship between anxiety and direct information seeking was negative. As a result, uncertainty discrepancy is unlikely to have a direct relationship with information seeking. Uncertainty discrepancies produce anxiety that is shown to have a negative effect on direct information seeking.

As a final step to test hypothesis 3, the indirect effect of uncertainty discrepancy on direct information seeking through the mediator was assessed. This indirect effect was calculated using a bootstrapping approach outlined by Preacher and Hayes (2004) using the INDIRECT SPSS macro (Preacher & Hayes, 2009). To create an estimate of indirect effects, the bootstrapping technique takes 1000 random samples of the data and calculates an indirect effect for each sample. The bootstrapped estimate of the indirect effect of uncertainty discrepancy on direct information seeking was -.33. This estimate represents the mean indirect effect calculated across all samples. The true indirect effect is estimated to lie between -.53 and -.14 with 95% confidence. Because zero does not lie in this 95% confidence interval, the indirect effect was significantly different from zero. A result significantly different from zero indicates uncertainty discrepancy has an indirect effect on direct information seeking, with the effect occurring through anxiety (Preacher and Hayes, 2004). This result suggests anxiety partially mediates the relationship between uncertainty discrepancy and direct information seeking and offers support for hypothesis 3.

Hypothesis 4

Hypothesis 4 proposed that issue importance, coping efficacy, communication efficacy, and outcome expectancy would moderate the relationship between anxiety and direct information seeking intention. As described earlier, the three proposed forms of efficacy failed to form one latent efficacy construct so communication and coping efficacy were entered separately. For the sake of simplicity, the model was tested in steps. A multiple tobit regression was first run to determine if the relationship between anxiety and direct information seeking was moderated by all or some of the proposed moderators. The significant moderators were then tested in a second multiple tobit regression that included uncertainty discrepancy. All moderators

are represented in the model as interactions between a given variable and uncertainty-related anxiety.

To test the first model, the interactions between the proposed moderators of uncertainty-related anxiety were entered into a model predicting direct information seeking. A main effect for uncertainty-related anxiety was significant and in the expected negative direction ($\beta = -6.00$, $t(265)=-6.81$, $p<.01$). Consistent with past findings, the linear effect for anxiety was -2.68 and the marginal effect was $.44$. Significant interactions were also found between anxiety and communication efficacy ($\beta = .09$, $t(265)=5.64$, $p<.01$, linear effect $=.04$, marginal effect $=-.01$) and issue importance ($\beta = .24$, $t(265)=2.42$, $p<.01$, linear effect $=.11$, marginal effect $=-.01$).

To decompose the significant interactions further, the effect of anxiety on direct information seeking was assessed at high and low levels of issue importance and communication efficacy. Each moderator variable was split into high and low levels close to its mean (communication efficacy $M=34.79$, issue importance $M=5.81$). Results are reported in Table 4.2. The relationship between anxiety and direct information seeking was significant only at high levels of communication efficacy, as well as at high and low levels of issue importance. Decomposition of the linear and marginal effects at these three levels (high communication efficacy and high/low issue importance), validated prior results showing that an increase in uncertainty-related anxiety decreased direct information seeking below the threshold (direct information seeking values <21). Also, an increase in anxiety increased the probability of direct information seeking below the threshold.

Table 4.2

*Relationship Between Anxiety and Information Seeking at High and Low Levels of
Communication Efficacy and Issue Importance*

| Variable | β | t | df | p | Linear effect | Marginal effect |
|--|---------|-------|------|-------------|---------------|-----------------|
| Low Communication Efficacy ^a | .89 | 1.00 | 108 | .32 | .49 | -.04 |
| High Communication Efficacy ^b | -2.30 | -3.68 | 165 | $p < .01^*$ | -.83 | .19 |
| Low Issue Importance ^c | -2.47 | -3.59 | 160 | $p < .01^*$ | -1.20 | .15 |
| High Issue Importance ^d | -1.85 | -2.07 | 118 | .04* | -.65 | .12 |

^a values ≤ 34.79 , $n=110$, ^b values ≥ 34.80 , $n=167$, ^c values ≤ 6 , $n=162$, ^d values = 7, $n=120$, * $p \leq .05$

The significant interactions (communication efficacy and issue importance) were then entered in a second multiple tobit regression to determine whether uncertainty discrepancy was a significant predictor of direct information seeking when controlling for the mediator and the moderators (uncertainty discrepancy \rightarrow anxiety * moderator \rightarrow direct information seeking). As Table 4.3 shows, all of the model terms were significant with the exception of the issue importance and anxiety interaction. This finding suggests that anxiety acts as a partial mediator of the relationship between uncertainty discrepancy and direct information seeking and that the effect of anxiety is moderated *only* by communication efficacy. The pseudo R-square value was also much higher with the inclusion of the moderators (.26 versus .07 in the model without the moderators). Decomposition of the tobit coefficients is also consistent with previous findings (further decomposition of the interaction terms was reported previously).

Table 4.3

Moderated Mediation Model Coefficients

| Variable | β | t (df=264) | p | Linear effect | Marginal effect |
|-------------------------------------|---------|--------------|-----|---------------|-----------------|
| Uncertainty Discrepancy (UD) | 1.02 | 3.20 | .00 | .46 | -.07 |
| UD Anxiety | -6.31 | -7.37 | .00 | -2.84 | .46 |
| Communication Efficacy x UD Anxiety | .11 | 6.72 | .00 | .05 | -.01 |
| Issue Importance x UD Anxiety | .17 | 1.64 | .10 | .07 | -.01 |

While the pseudo R-square value was larger when the moderators were included, the values are still not very high. As in past tests, information search and risk-related anxiety were added to the model as covariates post-hoc to determine whether they would increase the variance explained in direct information seeking. Much like previous tests, adding the additional sources of anxiety increased the pseudo R-square value ($R^2 = .30$), but the increase was slightly less dramatic than in previous results. In this model, information search anxiety was a significant predictor ($\beta = -.40$, $t(260) = -3.72$, $p < .01$, linear effect = $-.18$, marginal effect = $.03$) along with uncertainty-related anxiety ($\beta = -3.78$, $t(260) = -3.73$, $p < .01$, linear effect = -1.72 , marginal effect = $.29$) and the anxiety/communication efficacy interaction ($\beta = .08$, $t(260) = 4.92$, $p < .01$, linear effect = $.04$, marginal effect was $-.01$). The linear and marginal effects are all consistent with prior results. And, as in past tests, uncertainty discrepancy was not a significant predictor in the model.

As a final step to test hypothesis 4, the conditional indirect effects were assessed. Specifically, the question of whether uncertainty-related anxiety partially mediated the

relationship between uncertainty discrepancy and direct information seeking at various levels of communication efficacy was assessed. Conditional indirect effects and bootstrapped confidence intervals (robust to non-normality) were calculated using the MODMED SPSS macro developed by Preacher, Rucker and Hayes (2008). This macro is designed for assessing moderated mediation, as in the present set. Additionally, this macro allows the user to determine whether the indirect effects of the moderator are significant across various levels of the moderator.

Conditional indirect effects were calculated for the mean (34.71) and for values roughly one standard deviation above (42) and one standard deviation below the mean (27.40). Bootstrap confidence intervals were calculated for each of three values reported above. Much like in the previous decomposition of the tobit coefficients, the bootstrapped estimates showed that the conditional indirect effect of communication efficacy was significant only at the highest levels of communication (estimate = -.21). The 95% confidence interval (-.41 to -.02) did not include zero. This finding offers support for hypothesis 4 and the prediction of moderated mediation, although communication efficacy was the only proposed moderator that was significant and was significant only significant at high levels.

Model Comparison

One additional set of tests was conducted to provide some sense of how the revised TMIM model performed relative to the original model specified by Afifi and Weiner (2004). A series of regressions were conducted entering the predictors of direct information seeking sequentially to test for mediation and entered in the following order (closest to direct information seeking first): efficacy (step 1), outcome expectancy (step 2), uncertainty-related anxiety (step 3), and uncertainty discrepancy (step 4). Models were tested separately for coping efficacy and

for communication efficacy as in Afifi and Weiner (2006). Indirect effects were assessed using bootstrapping methods outlined by Preacher and Hayes (2008).

The model that included communication efficacy (Table 4.4) showed communication efficacy to be the only consistent predictor of direct information seeking and a mediator of the relationship between uncertainty discrepancy and direct information seeking along with anxiety (step four). The indirect effect of uncertainty discrepancy on direct information seeking through the mediators was assessed using a bootstrapping technique (Preacher & Hayes, 2008).

Bootstrapped confidence intervals showed communication efficacy to be the *only* significant mediator of the relationship between uncertainty discrepancy and direct information seeking. The 95% confidence interval for the true indirect effect was -.86 to -.29. Because this range did not include zero, communication efficacy could be considered a partial mediator.

While communication efficacy was shown to be a mediator of the relationship between uncertainty discrepancy and information seeking, this is not consistent with the original TMIM model predictions. The original TMIM views efficacy as a mediator of the relationship between anxiety and direct information seeking, not as a mediator of the relationship between uncertainty discrepancy and direct information seeking. It does not make sense theoretically that uncertainty discrepancies would produce communication efficacy that leads to direct information seeking. Therefore, these results do not offer support for the original TMIM model with communication efficacy.

Table 4.4

Regression Models Predicting Direct Information Seeking (Communication Efficacy)

| Variable | Step 1 (n=281) | | | | | Step 2 (n=276) | | | | |
|-----------------------------|----------------|--------|----------|---------|-------|----------------|--------|----------|---------|-------|
| | m1 → y | | | | | m2 → m1 → y | | | | |
| | Linear | | Marginal | | | Linear | | Marginal | | |
| | β | effect | effect | t (279) | p | β | effect | effect | t (274) | p |
| Communication Efficacy (M1) | .4 | .18 | -.03 | 8.66 | <.01* | .39 | .18 | -.03 | 8.02 | <.01* |
| Outcome Expectancy (M2) | | | | | | .32 | .15 | -.02 | 1.29 | .20 |
| Anxiety (M3) ^a | | | | | | | | | | |
| Uncertainty Discrepancy (X) | | | | | | | | | | |
| R ² | .24 | | | | | .26 | | | | |

(table continues)

Table 4.4 (continued)

Regression Models Predicting Direct Information Seeking (Communication Efficacy)

| Variable | Step 3 (n=272) | | | | | Step 4 (n=262) | | | | |
|-----------------------------|----------------|--------|----------|----------------|----------|---------------------|--------|----------|----------------|----------|
| | m3→m2→m1 →y | | | | | x → m4 →m3 →m2→m1→y | | | | |
| | Linear | | Marginal | | | Linear | | Marginal | | |
| | β | effect | effect | <i>t</i> (270) | <i>p</i> | β | effect | effect | <i>t</i> (260) | <i>p</i> |
| Communication Efficacy (M1) | .39 | .18 | -.03 | 7.53 | <.01* | .42 | .19 | -.03 | 7.98 | <.01* |
| Outcome Expectancy (M2) | .24 | .11 | -.02 | .94 | .35 | .16 | .07 | -.01 | .62 | .54 |
| Anxiety (M3) ^a | -.30 | -.14 | .02 | -.59 | .55 | -1.04 | -.48 | .08 | -1.95 | .05* |
| Uncertainty Discrepancy (X) | | | | | | 1.12 | .52 | -.08 | 3.71 | <.01* |
| <i>R</i> ² | .27 | | | | | .31 | | | | |

**p*<.05, a=uncertainty-related anxiety

Table 4.5

Regression Models Predicting Direct Information Seeking (Coping Efficacy)

| Variable | Step 1 (n=279) | | | | | Step 2 (n=272) | | | | |
|-----------------------------|----------------|--------|----------|----------|-------|----------------|--------|----------|----------|-------|
| | m1 → y | | | | | m2 → m1 → y | | | | |
| | Linear | | Marginal | | | Linear | | Marginal | | |
| | β | effect | effect | $t(277)$ | p | β | effect | effect | $t(270)$ | p |
| Coping Efficacy (M1) | .25 | .11 | -.02 | 3.26 | <.01* | .21 | .09 | -.01 | 2.77 | <.01* |
| Outcome Expectancy (M2) | | | | | | 1.08 | .47 | -.07 | 4.04 | <.01* |
| Anxiety (M3) ^a | | | | | | | | | | |
| Uncertainty Discrepancy (X) | | | | | | | | | | |
| R^2 | .04 | | | | | .10 | | | | |

(table continues)

Table 4.5 (continued)

Regression Models Predicting Direct Information Seeking (Coping Efficacy)

| Variable | Step 3 (n=269) | | | | | Step 4 (n=259) | | | | |
|-----------------------------|----------------|--------|----------|----------------|----------|---------------------|--------|----------|----------------|----------|
| | m3→m2→m1 →y | | | | | x → m4 →m3 →m2→m1→y | | | | |
| | Linear | | Marginal | | | Linear | | Marginal | | |
| | β | effect | effect | <i>t</i> (267) | <i>p</i> | β | effect | effect | <i>t</i> (257) | <i>p</i> |
| Coping Efficacy (M1) | .14 | .06 | -.01 | 1.71 | .09 | .14 | .06 | -.01 | 1.67 | .09 |
| Outcome Expectancy (M2) | 1.01 | .44 | -.07 | 3.74 | <.01* | 1.04 | .46 | -.07 | 3.83 | <.01* |
| Anxiety (M3) ^a | -1.33 | -.57 | .09 | -2.31 | .02* | -1.83 | -.80 | .12 | -2.93 | <.01* |
| Uncertainty Discrepancy (X) | | | | | | .72 | .32 | -.05 | 2.15 | .03* |
| <i>R</i> ² | .12 | | | | | .14 | | | | |

**p*<.05, a=uncertainty-related anxiety

The models including coping efficacy (Table 4.5) did provide some validation for the original TMIM structure. There is evidence in Table 4.5 (steps 2 and 3) to suggest that outcome expectancy mediates the relationship between anxiety and direct information seeking. To confirm this, indirect conditional effects were tested. The bootstrapped confidence intervals confirmed that anxiety had a significant indirect effect on direct information seeking through outcome expectancy (95% confidence interval = $-.39$ to $-.02$). However, when testing whether all three proposed mediators (outcome expectancy, coping efficacy, and anxiety) mediated the relationship between anxiety and direct information seeking, bootstrapped confidence intervals showed anxiety to be the only partial mediator of the relationship between uncertainty discrepancy and direct information seeking ($-.55$ to $-.09$). The 95% confidence intervals for the other mediators (coping efficacy and outcome expectancy) included zero, which suggests that these variables do not partially mediate the relationship between uncertainty discrepancy and direct information seeking.

Understanding Family Health History

In addition to testing the model structure, an additional hypothesis and two research questions were posed about family health history information seeking.

Research Question 1

The first research question asked about the situations that prompted family health history discussions. Participants were asked to indicate all the situations in which family discussions about family health history occurred. While just over 7% ($n=22$) of participants reported never having these conversations, many were able to recall when these conversations occurred. Table 4.6 reports these results. The results show that health problems and death most often prompted family discussions, while marriage and pregnancy did so less often. This finding may be a

reflection of the nature of the events. Weddings or pregnancy are generally celebratory times while death or illness can be times of high anxiety and concern. Among the 13 people who provided some “other” response about when they had family discussions about health history, some said they discussed health history if it was needed for a doctor visit, form, or class project. Participants also reported discussing health history in response to a personal health problem or because a family member worked in the health care field.

Table 4.6

Situations Prompting Family Health History Discussions

| | N | % of total sample |
|---|-----|-------------------|
| Health Problems/Illness | 223 | 73% |
| Death | 181 | 59% |
| Family Gathering | 103 | 34% |
| Family member asked about it. | 88 | 29% |
| Family member saw something in the media. | 82 | 27% |
| Marriage | 59 | 19% |
| Pregnancy or Childbirth | 54 | 18% |
| Other | 13 | 4% |
| Genetic test | 11 | 4% |

Hypothesis 5

Hypothesis 5 predicted that participants would have higher intention to approach female family members than male family members to discuss family health history. Participants were asked to indicate the person they would approach first, second, and third to discuss family health

history. Table 4.7 reports these results. Out of people who responded, 80% (N=210) said they would approach their mother first for information, supporting the notion that people would approach a female family member first and validating hypothesis 5.

Table 4.7

Intention to Approach Family Members about Family Health History

| | Approach First | | Approach Second | | Approach Third | |
|-------------------|----------------|------------------------|-----------------|------------------------|----------------|------------------------|
| | (N=262) | | (N=253) | | (N=209) | |
| | N | % of total respondents | N | % of total respondents | N | % of total respondents |
| Mother | 210* | 80% | 38 | 15% | 3 | 1% |
| Father | 34 | 9% | 140* | 55% | 30 | 14% |
| Sister | 3 | 1% | 17 | 7% | 36 | 17% |
| Brother | | | 5 | 2% | 22 | 11% |
| Grandmother | 11 | 4% | 31 | 12% | 69* | 33% |
| Grandfather | 2 | <1% | 3 | 1% | 9 | 4% |
| Aunt | 3 | <1% | 18 | 7% | 50 | 23% |
| Uncle | | | 1 | <1% | 20 | 9% |
| Female Cousin | | | 3 | 1% | 8 | 4% |
| Great Grandmother | | | | | 1 | <1% |
| Great Grandfather | | | | | 1 | <1% |

* indicates highest ranking

Interesting, however, is that the majority of respondents said they would approach their father (n=140; 55%) second as opposed to another female family member. In terms of whom respondents would approach third, the results were more mixed. However, respondents most

often said they would approach a grandmother (n=69, 33%). While these results suggest mothers will be approached first, they also indicate that immediate family members (with the exception of brothers and sisters) are perceived to be the best source of information. Extended family members are approached only after talking to the immediate family.

Research Question 3

The final research question assessed how males and females differed across TMIM variables in an attempt to understand information management differences. As in Afifi et al. (2006) tests of difference for each of the TMIM models were conducted with gender as the independent variable. In this study, Mann-Whitney tests were used because of some variables (non-transformed) exhibited non-normal distributions. A Bonferroni adjusted significance level was used to account for multiple tests ($p=.006$). Results are presented in Table 4.8

Table 4.8

| <i>Means and Tests of Gender Difference Across TMIM Variables</i> | | | | |
|---|---------------------|-------------------|----------|----------|
| | Female ^a | Male ^a | | |
| Model Variable | (n=242) | (n=58) | <i>U</i> | <i>p</i> |
| Uncertainty Discrepancy | 4.27 | 3.19 | 5714.00 | .09 |
| Uncertainty Discrepancy Anxiety | 3.11 | 2.77 | 6151.50 | .10 |
| Information Search Anxiety | 2.36 | 1.97 | 6005.00 | .08 |
| Risk Related Anxiety | 2.19 | 2.11 | 5897.00 | .04 |
| Issue Importance | 5.95 | 5.25 | 5246.50 | .001* |
| Outcome Expectancy | 5.51 | 5.72 | 6452.50 | .40 |
| Communication Efficacy | 5.76 | 5.88 | 6836.00 | .75 |
| Direct Information Seeking | 5.89 | 5.77 | 5795.50 | .23 |

^a means reported are raw means, * $p \leq .05$

Results showed that males and females did not differ significantly on most of the TMIM variables. They differed only on one variable, issue importance, with females thinking the issue of family health history was more important than males. Unexpectedly, males and females did not differ in terms of their desire for information and their intention to directly seek information seeking. This finding was surprising given past research that suggests women communicate about family health history more than men.

CHAPTER 5

DISCUSSION

The goal of this dissertation was to present a revised version of the Theory of Motivated Information Management and test it in the context of family health history. While past studies of the TMIM provide important insights into the process of information management (Afifi & Weiner, 2006), they have shown only partial support for the model (Afifi & Matsunaga, 2008). The revised model predicts that uncertainty-related anxiety mediates the relationship between uncertainty discrepancy and direct information seeking, and is moderated by issue importance, outcome expectancies, and efficacy. A survey of engaged individuals planning to get married was conducted online and in-person at bridal fairs to measure each of the TMIM variables and to assess intention to directly seek information about family health history. The present study provides support for many of the proposed refinements to the TMIM and uncovers important information about intention to seek family health information.

This chapter begins with a summary of the overall performance of the revised model, including unsuccessful predictions and the impact of additional sources of anxiety on direct information seeking. The chapter then goes on to discuss what the tests of the model reveal about the nature of family health information seeking. Finally, the limitations of the study, implications for health communication, and future testing of the model are discussed.

Performance of the Revised Model

This study provided support for a revised TMIM model predicting direct information seeking. Specifically, it was shown that family health history uncertainty discrepancies predicted

the production of uncertainty-related anxiety (H2), that uncertainty-related anxiety predicted intention to directly seek information about family health history (H3), and that uncertainty-related anxiety partially mediated the relationship between uncertainty discrepancy and intention to directly seek information about family health history (H4). Additionally, communication efficacy was shown to moderate the relationship between anxiety and direct information seeking such that low anxiety predicted intention to directly seek information when communication efficacy was high (partial support for H5). Figure 5.1 illustrates the significant TMIM model paths and the direction of the relationships.

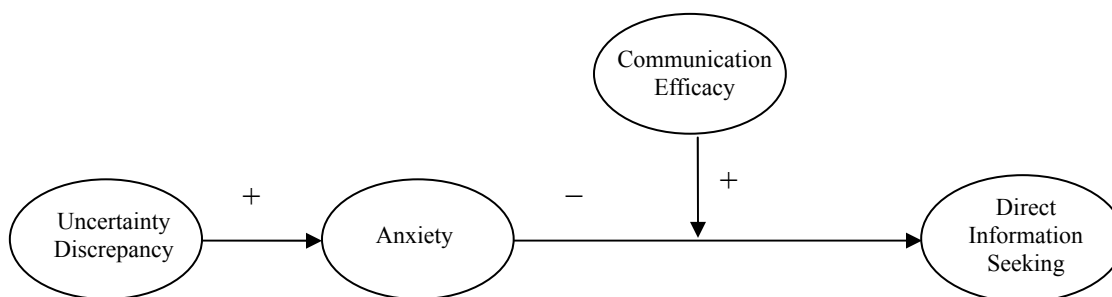


Figure 5.1: Significant paths in the revised TMIM model

While the model did not perform exactly as hypothesized, the results suggest it provided a better fit to the data than the original model hypothesized by Afifi and Weiner (2004). The present study did not find support for the original model tested with communication efficacy. While there was some support for the model with coping efficacy, the pseudo R-square for the original model with coping efficacy was .14 compared to .26 for the revised model with moderators. Afifi et al. (2004) report that the original model was able to account for only 7% to 20% of the variance in individual's decisions to actively seek or avoid information in close personal relationships, so the revised model is clearly an improvement.

This test of the revised TMIM model also showed that the relationship between anxiety and information seeking was negative, consistent with past tests of the TMIM (Afifi et al., 2004). People in the present study were more likely to seek information when uncertainty-related anxiety was low and when communication efficacy was high. It is often assumed that anxiety is motivating and that higher levels of anxiety increase the likelihood of action. Drive theories suggest that when negative emotions (such as fear) are aroused people will be motivated to take action to alleviate the unpleasant state (Sutton, 1982). However, past literature in the area of information processing (Hale, Lemieux, and Mongeau (1995) and information seeking (Smith et al., 2006) suggests that lower levels of anxiety also lead to more message-relevant processing and information seeking. Turner et al. (2005) label this phenomenon “affective interference” (p. 142), whereby a heightened level of affect impedes systematic processing of information. In the present study, high levels of anxiety decreased the likelihood of direct information seeking.

Model Failures

While the basic structure of the revised TMIM was confirmed, some of the model predictions failed. First, the model did not fit as hypothesized because coping efficacy, issue importance, and outcome expectancies were not shown to moderate the path from anxiety to direct information seeking. Communication efficacy was the only variable confirmed as a moderator of the relationship between anxiety and intention to seek information, which is likely the result of relatively low correlations between the non-significant variables and direct information seeking ($r=.19$ to $.22$) and a high correlation between communication efficacy and direct information seeking ($r=.48$).

Second, this test of the model did not confirm that communication, coping, and target efficacy formed a latent efficacy construct, which led to the decision to test communication and

coping efficacy separately in the model. The finding is not unique to the present study and not surprising. Every past test of the TMIM framework has called into question whether the three unique forms of efficacy form one latent efficacy construct. In this study several things were attempted to improve the measures of efficacy. An attempt was made to broaden the coping efficacy concept to include both positive and negative measures because it was believed that the current measures may not be capturing all aspects of coping efficacy. However, positive coping efficacy measures explained relatively little variance in coping efficacy. Additionally, confirmatory factor analysis was used to confirm the unidimensionality of the scales. In past studies, Afifi and colleagues simply summed individual items deemed reliable without assessing their dimensionality. The present study showed that dimensionality is likely at the heart of efficacy's failure in past studies. While confirmatory factor analysis was able to determine that the coping efficacy items formed one factor, it did not confirm that the items measuring communication and target were two separate factors. Thus, coping and communication efficacy (including measures of communication and target efficacy) were used in the present study, as in Afifi et al. (2006).

The fact that a two-factor efficacy structure has been confirmed twice in tests of the TMIM indicates that problems with efficacy may be theoretical as well as methodological. The two-factor efficacy structure confirmed here aligns very closely with a phase-specific self-efficacy approach as defined by Schwarzer and Renner (2000). The phase approach suggests that self-efficacy is functional at different levels and at different points in time. Schwarzer and Renner (2000) distinguish between *action* self-efficacy and *coping* self-efficacy. Action self-efficacy is efficacy related to the action of adopting a behavior while coping efficacy refers to one's ability to deal with barriers that arise. In the TMIM model, communication and target

efficacy are efficacy assessments related to the “action” of information seeking (i.e. Do I feel capable performing the behavior? Will my family be able to provide me with the needed information?). Schwarzer and Renner’s (2000) coping efficacy is virtually the same concept as coping efficacy in the TMIM and refers to whether individuals believe they have the confidence and ability to deal with potential barriers or bad news.

One important difference between the phase-specific approach and Afifi and Weiner’s (2004) approach to self-efficacy is that the two types of efficacy are not part of a latent efficacy construct. The two types of efficacy in the Schwarzer and Renner model are tested separately, as was the case in this investigation. The continued failure of the latent efficacy construct is a call for reconceptualization of the efficacy concept. A phase-specific provides a theoretical justification for the results found in the present study and may be one approach to conceptualizing efficacy in the future.

Additional sources of anxiety in the model. In this test of the TMIM, two additional sources of anxiety were entered as covariates to determine if they explained additional variance in direct information seeking. While these two sources do not begin to explain the potential impact of emotion on information seeking, they were chosen as a starting point for understanding emotions other than uncertainty-related anxiety. Specifically, information search anxiety (anxiety about the process of searching for family health information) and risk-related anxiety (anxiety individuals have about their own level of risk because of family health history) were tested. Results showed that when entered as covariates, risk-related anxiety had little impact on direct information seeking. However, information search anxiety was a significant predictor of direct information seeking, improved the fit of the model substantially, and seemed to overpower the effects of other variables in the model. It also had the same effect on intention to directly seek

information as did uncertainty-related anxiety (i.e. low anxiety facilitated intention to direct information seek). What is not clear from these results, however, is (a) where these additional emotions originate from, and (b) what role they play in information management process. The present study suggests they do not mediate the relationship between uncertainty discrepancy and intention to seek information as does uncertainty-related anxiety.

The strong effect of information search anxiety on direct information seeking observed in this study is supported by theories such as Wilson's (1999) Information Seeking Behavior Model. The theory suggests that psychological variables may intervene in the process of information seeking, particularly when interpersonal interaction is needed to obtain information (Wilson and Walsh, 1996). In the present study low information search anxiety was shown to have a positive effect on direct information seeking, but in other cases anxiety may have a negative effect. This dissertation represents the first test of the TMIM to include additional sources of emotion, but it is not the first to examine emotion in the context of information seeking. Dervin and Reinhard (2007) provide an extensive overview of the way emotion is conceptualized in the information seeking literature. Emotion is not just conceptualized as a driver of information seeking (as in the TMIM), it may also arise out of information seeking situations or tasks (Dervin & Reinhard, 2007). As Kulthau (1991) writes, "the very nature of the information search process creates a climate for potential anxiety" (p. 370). The present study suggests that while anxiety can act as a mediator of the relationship between uncertainty discrepancy and direct information seeking, situational emotions (i.e. information search anxiety) may also play a significant role.

General Conclusions about Family Health Information Seeking

Beyond the basic functioning of the TMIM model, this study revealed important insights about people's knowledge of family health history and their information seeking decisions. Specifically, this study focused on the predictors of intention to directly seek information. Results revealed that engaged individuals preparing for marriage experience uncertainty discrepancies about their family health history and desire more information from their families. These findings are in contrast to past research that suggests people assume they know their family health history and are not concerned about it until diagnosed with a disease themselves (Foster, Watson, Moynihan, Jones, & Eeles, 2002).

As in past research, this study showed that a desire for more information about one's family health history produced low levels of anxiety. Thus, as uncertainty management theory suggests, it is the need for information and not just the existence of uncertainty that is motivating (Brashers, 2001). What is unique about the present study is that it illustrates even small uncertainty discrepancies have the potential to raise anxiety. However, results illustrate that uncertainty discrepancies about family health history are likely small and not extremely anxiety provoking. One explanation is that participants in the sample may exhibit little anxiety and worry about the topic generally. An additional explanation for why family health history uncertainty discrepancy was low is because asking people to provide a family health history raised the topic artificially in the study. Real-life situations in which people seek family health information may be more anxiety provoking. As the results of this study show, conversations about family history in families were more often prompted by family illness or death when anxiety is likely high.

Even though anxiety was low, it was a significant predictor of intention to directly seek information. Results showed that intention to seek information was high when anxiety was low

and communication efficacy was high. The finding may reflect the fact that high levels of anxiety can deter information seeking and lead people to choose other information strategies. The TMIM proposes that under conditions of high anxiety people may avoid information or cognitively reappraise their need for information rather than seeking information to reduce the anxiety (Afifi and Weiner, 2004). However, the findings of the present study suggest people with low anxiety are more uninhibited and willing to talk to their family members when they feel confident about their ability to communicate with them.

Interestingly, this study showed no significant gender differences in terms of intention to directly seek information. This finding was unexpected given the literature that suggests people who collect family health information are more likely to be female, educated beyond high school, and married (Yoon et al., 2004). One gender difference that was clear, however, is the fact that participants intended to approach female family members first about their family health history. Over 80% of respondents indicated they would approach their mother first. This supports research showing that women are asked first about family health history, as informed first about genetic testing, and are expected to pass on information (Gamm, Nussbaum, & Biesecker, 2004; Hunt, Davison, Emslie, & Ford, 2000; Sanders, Campbell, Donovan, & Sharp, 2007). Interestingly, though, is the finding that people would approach fathers second for information before other female members. Nearly 55% of respondents said they would approach their father second, suggesting that people feel more comfortable seeking information in their immediate family before extending to second and third generations. The result is not surprising given research that shows that age gaps, losing touch with family members, and not being close to family members inhibits people from asking about their family health history (Green, Richards, Murton, Statham, & Hallowell, 1997).

Implications for Health Communication

It has been suggested that family histories be used in public health to assess disease risk and influence early detection and prevention (Yoon et al., 2004; Yoon, Scheuner, & Khoury, 2003; Yoon et al., 2002). In response, tools for collecting family health information have been developed by state public health departments and federal agencies, and the Surgeon General designated Thanksgiving Day as National Family History Day. The goal of these public health efforts is to raise awareness of risk based on family health history and to increase interpersonal communication about the topic.

As this study shows, asking people to record a family health history can be an effective strategy for revealing knowledge gaps and increasing communication. Conversations about family health history are not necessarily everyday topics of communication and people may not realize they lack information about family health until they are asked to provide it. As participants in this study reported, situations that most often prompted discussions about family history were family illnesses and death. Campaigns hoping to increase communication about family health history must raise uncertainty and anxiety to the point that individuals are motivated to ask their family members for more information. Asking people to record their family health history to increase uncertainty may be one approach. Another approach would be wider distribution of tools such as the Surgeon General's *My Family Health Portrait* and/or having these types of tools more widely available in public places, including medical offices and public health clinics.

The results of this study instead suggest that low anxiety situations may be optimal for health communication efforts. People in this sample reported higher intention to direct information seek when anxiety was low and communication efficacy was high. If the goal of

health communication efforts focused on family health history are to increase overall communication so people have better access to information about family health, high anxiety situations may be not appropriate. A campaign placed in the waiting room of a mammography screening unit, for example, may hinder direct information seeking. Thus, interventions designed to increase communication should be careful not to raise fear or threat. Additionally, messages encouraging individuals to talk to their families about health history must help build confidence in people's ability to talk to families and obtain the information that they need.

Family gatherings may be ideal situations for family health history interventions, particularly since 34% of respondents reported that this situation had prompted a family discussion of health history in the past. While a few examples of interventions in this setting exist, the Utah Department of Health has developed a family reunion kit with tools to help organizers encourage communication about family health history. A family gathering is ideally a more relaxed and comfortable setting for family health history conversations than a visit to the hospital or emergency room, for example. Because several family members are all in one place, gathering the information is likely to be easier and may help people feel confident they can obtain the needed information. Additionally, campaigns in this setting can be framed as benefit to everyone in the family (not just the information seeker).

Study Limitations

While this study offered new insights into the performance of a revised TMIM, there were several limitations. One major limitation was measurement of the TMIM constructs. As discussed previously, several of the measures of information management were neither reliable nor one-dimensional. Additionally, measures of information importance and outcome expectancy exhibited multi-collinearity, suggesting substantial overlap between the items. Even the measures

that showed some semblance of fit did not exhibit excellent fit to the data. Thus, it is absolutely essential to focus on measurement of TMIM variables. With the exception of the present study, no tests of the TMIM have assessed the unidimensionality of the items. The results of the present underscore the notion that “considerable work remains to be done with the TMIM measures before any real comfort with the psychometric properties can be reached” (Afifi et al., 2004).

One measurement in particular that needs improvement is uncertainty discrepancy. Because uncertainty discrepancy is defined as a knowledge gap, items measuring desired knowledge are subtracted from current knowledge. One limitation with this approach is that it includes measures of zero and negative measures (i.e. situations when people have more information than they desire). It is not entirely clear whether zeros should be included in the analysis (since they represent no uncertainty discrepancy) and whether negative uncertainty discrepancies should be interpreted in context of the TMIM model.

A second limitation of this study was the fact that only direct information seeking was assessed. While this limitation is consistent with past research on the TMIM (Afifi et al., 2006), it did not allow for a full investigation of the TMIM framework. It was not possible to discern, for example, whether high anxiety leads to avoidance or the use of indirect communication strategies. In order to test a full range of information management strategies, more work must be done conceptualizing information management and developing reliable measures of information seeking and avoidance.

A third limitation is the fact that information seeking intention was measured rather than actual direct information seeking. While people reported high levels of intention, it does not necessarily mean that they will seek the information. The way that direct information management questions were phrased may also have been problematic. Questions used in the

present study asked people how they *would talk* to their family about health history generally rather than measuring their actual *intention to talk*. While this approach provides information about the type of strategy they would pick, it is not the same as observing actual behavior.

One final limitation was the sample itself. There was little variance in many of the responses across the sample. Individuals as a whole tended to report low levels of anxiety, high intention to direct information seek, and relatively high efficacy and outcome expectancies. Thus, very few of the model variables were normally distributed. This non-normal distribution is likely reflective of the homogeneity of the sample. Most participants were in their twenties, female, and probably in good health. It would have been a better to include more diverse participants, particularly in terms of age.

Plans for Future Research

The results of this investigation show that a revised version of the TMIM holds promise for predicting information management behaviors. However, the model must undergo significant testing to determine its viability as an alternative to the original TMIM, and the measures of model constructs must be improved. One area for future research is the definition and measurement of information management. While having three types of information management (information seeking, avoidance, and cognitive reappraisal) allows researchers to examine a variety of strategies, the relationships between them are not clear. For example, do individuals choose one information management strategy (such as direct information seeking) or can they use multiple strategies simultaneously? One TMIM study measured participants on both avoidance and search directness (Afifi et al, 2004), while others have looked just at direct information seeking. It is also not clear whether information management strategies are discrete

or lie along a continuum (avoidance → indirect information seeking → direct information seeking).

In short, a better definition of the forms of information management and their relationship to one another is needed. Additionally, if the model is truly a model of “information management” as opposed to “information seeking” then tests must begin to look closer at avoidance and cognitive reappraisal in addition to information seeking. Traditional approaches to testing the TMIM, however, are not able to tease out these distinctions between the variables. Qualitative approaches may be helpful in understanding people’s orientation towards each type of information management, when they use each type, and the factors that lead them to make these decisions.

As suggested earlier, future theorizing and testing of the model should also consider whether efficacy in the TMIM can be adequately expressed as a two-factor latent construct comprised of action and coping efficacy instead of a three-factor latent construct. A two-phased approach to efficacy (Schwarzer & Renner, 2000) was supported by the results of the present study and seems to mirror the definition of efficacy used in the TMIM, but it has not been tested within the model framework. Future tests of the TMIM should include measures of action and coping efficacy to determine how reliable the measures are in the TMIM context and whether the measures increase variance explained in information seeking.

Future research must also address how emotion functions within the TMIM framework. This study confirmed that uncertainty-related anxiety and information search anxiety were negative predictors of direct information seeking. Future tests of the TMIM must examine anxiety at *both* high and low levels to determine whether its effect on direct information seeking is similar or different. This type of investigation will also allow researchers to better understand

the effects of moderator variables on the relationship between anxiety and information management at various levels of anxiety. For example, do perceptions of low efficacy and poor outcome expectancies decrease the likelihood of information seeking when anxiety is low? Additionally, the model should consider not only *state anxiety* (anxiety that results from a set of circumstances including uncertainty-related and information-search anxiety), but *trait anxiety* (anxiety that is a personality trait or enduring quality; Hale and Dillard, 1995). Future research should examine whether the model functions differently for people with high versus low trait anxiety, looking specifically at whether individuals with high trait anxiety desire more information, feel more uncertainty-related anxiety, and are more or less likely to directly seek information.

While this study looked at various sources of anxiety, it is not the only emotion that may result from uncertainty discrepancies nor is it the only emotion present. Dillard, Plotnick, Godbold, Freimuth and Edgar (1996) found that AIDS public service announcements not only produced fear but also decreased happiness and puzzlement, increased sadness, and both increased and decreased anger and surprise. Future research must continue to measure additional sources of emotion to determine whether they act as facilitators or barriers to information management strategies. One strategy for examining the role of emotion in the TMIM, which takes its cue from cognitive appraisal theories, is to determine the emotions that result from the cognitive appraisals of uncertainty discrepancy, efficacy, outcome expectancies, issue importance, and direct information seeking (Omdahl, 1995).

Finally, to truly improve the predictive power of the TMIM and to gain a “big picture view” of health information seeking it is important take a step back from current models, which have limited predictive power, and use more formative research approaches to observe

information seeking in real time. Information seeking is often assessed before (intention) or after (reflection) rather than during the process. Methodologies to assess information seeking such as those used by Afifi et al. (2006), whereby participant conversations of organ donation were facilitated and observed, may offer new insights into the factors that affect the process of information seeking. Alternatively, approaches such as observation, journals, and questionnaires can be used to get inside the search process from the information seekers perspective and further develop theories of health information seeking (Kulthau, 1991). Approaches such as these would allow researchers to uncover not only that phenomena such as communication efficacy or uncertainty discrepancies exist, but why they exist and how they relate to other variables in the TMIM model.

Conclusion

The goal of this dissertation was to refine and test the Theory of Motivated Information Management. This theory plays an important role in the information seeking literature, being one of the first general information seeking theories to focus on interpersonal information seeking. The limited scope of this theory is especially attractive for an investigation of family health history because family health information is obtained almost exclusively through interpersonal channels. The revised version of the theory maintains the basic structure of the TMIM (anxiety partially mediates the relationship between anxiety and information management) while proposing that variables such as efficacy and outcome expectancies moderate the relationship between anxiety and information seeking. The results of this examination provide support for the model, particularly that anxiety acts as a partial mediator. Results also show that at high levels communication efficacy acts as a moderator of the relationship between anxiety and direct

information. While the model was not fully supported, the results illustrate the viability of a revised version of the TMIM model.

This test of the revised TMIM also provides new insights about the nature of direct information seeking with regards to family health history. People exhibited higher intention to directly seek information when anxiety was low and communication efficacy was high, and they planned to approach mothers first for information (supporting research that suggests female family members are often approached first). Thus, health communication campaigns promoting the taking of family health histories must be careful to avoid raising uncertainty and anxiety to a level that is counterproductive. Campaigns must help people feel efficacious and confident in their ability to obtain the needed information.

While there are clearly limitations in terms of the measurement of TMIM constructs, this project represents a critical step in the refinement of the Theory of Motivation Information Management. Testing alternative models is an important step in theory building and only through rigorous investigation of theoretical concepts can we create better theory. Thoroughly tested, universal theories of health information seeking are severely needed to explain and predict health communication behavior. Well-developed theories of health information seeking can help researchers better understand the barriers and facilitators of communication and can be used in the design of campaigns to stimulate information acquisition. While health information seeking is not necessarily a health protection behavior by itself, the process is a necessary prerequisite to increased knowledge and healthy decision making.

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APPENDIX A

PILOT STUDY INTERVIEW PROTOCOL

Read this statement aloud to your respondent after completing the informed consent:

“Compiling a family health history can help you identify health conditions that you might be at risk for and guide behaviors to reduce your risk of illness or to detect conditions early. While 96% of Americans believe knowing their family history is important, only one-third of Americans have ever tried to gather their family’s health history. To be most helpful, a health history should go back three to four generations and include your grandparents, parents, siblings, children and grandchildren, aunts and uncles, nieces and nephews, and cousins. You should have information about dates of birth, ages and causes of death, and major medical conditions and illness. It’s also good to know about health problems that affected their health and lifestyles factors (such as smoking or obesity).

“In this survey I am going to ask about your impressions of health history and what you think it might be like to talk to family members about it. “

- 1) How important is knowing your family health history to you?
- 2) How critical is it to your health that you know your family’s health history?

I will now ask you some questions about how comfortable you feel with the amount of information you have about your family’s health history. I am going to read you a statement and I want you to tell me if you agree, disagree, or are somewhere in the middle. *(Note: if they disagree or are in the middle, you should also ask them why).*

I have complete and adequate information about my family's health history going back 3-4 generations, including medical conditions and ages/causes of death. Do you agree, disagree, or are you somewhere in the middle when it comes to this statement?

- 1) I wish I knew more about my family's health history. Do you agree, disagree, or are you somewhere in the middle when it comes to this statement?

Now I would like you to tell me whether you agree, disagree, or are somewhere in the middle about these statements. (*Note: if they agree with these statements you should ask them why*)

- 1) The difference between how much I know and how much I'd like to know about my family health history makes me uneasy. Do you agree, disagree, or are you somewhere in the middle?
- 2) Not having as much information about my family health history as I would like makes me nervous. Do you agree, disagree, or are you somewhere in the middle?

I want you to think now for a moment about what talking to other family members about family health history would be like.

- 1) Do you feel you have the communication skills to talk to your family about family health history to get the information you need?
- 2) Would thinking about having this kind of conversation about family health history make you anxious at all? Why?
- 3) How would you go about getting family health history information?
- 4) Do you think that talking with family members about family history would produce negative outcomes, positive outcomes, or a little of both?
- 5) What benefits do you think might come from talking to your family about health history?

Now I would like to ask you some questions about the information you might receive from family members about your health history.

- 1) Do you think family members would be upfront and willing to share information they had about family history?
- 2) Do you think some family members would be more willing to share than others?
- 3) Do you think some family members might hide information? Why?

Now I would like you to consider how you would handle outcomes from a discussion about health history with your family.

- 1) Imagine that a family member became upset when you asked what a relative had died from. What would you do?
- 2) Imagine you discovered you were more at-risk for a disease than you thought? How would you cope?
- 3) Imagine you discovered that information about your family health history had been withheld from you? How would you respond?

Which of these phrases best describes how you would go about getting family health history information? (*Circle one*)

- a) I would ask family members directly about what they know about our health history.
- b) I would be more indirect by hoping the topic comes up, waiting until someone is affected by a disease, or hinting that you might want to know.
- c) I don't want to know more about my health history and I would avoid talking about it with family.

- 1) Why did you choose the statement that you did? This completes the survey. Do you have any questions for me? Thank you for your participation.

APPENDIX B

PILOT STUDY INTERVIEW CODING SCHEME

1. How important is knowing your family health history to you?
 - a) very important
 - b) important
 - c) somewhat important
 - d) not important
 - e) other

2. How critical is it to your health that you know your family's health history?
 - a) very critical
 - b) critical
 - c) somewhat critical
 - d) not critical
 - e) other

5. The difference between how much I know and how much I would like to know makes me uneasy?
 - a) I already know enough
 - b) I know some information
 - c) I would like to know more
 - d) I don't worry much family history/health
 - e) going to die eventually
 - f) religious
 - g) other

6. Not having as much information about my family health history as I would like makes me nervous.
 - a) I already know enough
 - b) I know some information
 - c) I would like to know more
 - d) I don't worry much family history/health
 - e) going to die eventually
 - f) religious
 - g) other

8. Would thinking about having this kind of conversation about family history make you anxious?
- a) nervous about what I might find out
 - b) nervous about how my family might react
 - c) nervous for some other reason
 - d) not nervous because have open communication/relationships with my family
 - e) not nervous b/c of other reason
 - f) other
9. How would you go about getting family health history information?
- a) immediate family (parents, brother, sister)
 - b) grandparents
 - c) extended family
 - d) family members generally
 - e) search records
 - f) other
10. Do you think that talking with family members about family health history would produce negative outcomes, positive outcomes, or a little of both?
- a) would bring back sad memories
 - b) depends on who I am talking to
 - c) knowledge of family health history important
 - d) other
11. What benefits do you think might come from talking to your family about health history?
- a) gain more knowledge
 - b) engage in prevention behaviors
 - c) can make doctor aware
 - d) can identify warning signs and conditions
 - e) increase communication/openness in family
 - f) prevent health problems
 - g) other
12. Do you think family members would be upfront and willing to share information they had about family health history?
- a) some more willing than others
 - b) not everyone knows the information
 - c) everyone would be willing to share
 - d) have shared already
 - e) other

14. Do you think some family members might hide information? Why?
- a) embarrassment/ashamed
 - b) painful/difficult topic
 - c) some people can't handle the info
 - d) people are private
 - e) family is open and honest
 - f) no reason to hide
 - g) don't want others to worry
 - h) other
 - i) unsure about info
15. Imagine a family member become upset. What would you do?
- a) apologize
 - b) bring it up in a different way
 - c) postpone asking
 - d) let them know its important or tell them why I asked
 - e) drop it
 - f) ask someone else
 - g) comfort/console tem
 - h) ask why they were upset
 - i) other
16. Imagine you were more at-risk than you thought. How would you cope?
- a) change behaviors
 - b) go to the doctor
 - c) educate myself/get more info
 - d) continue to be healthy
 - e) emotional response ("I would be upset or I would be angry")
 - f) pray/seek spiritual guidance
 - g) other
17. Imagine information was withheld from you? How would you respond?
- a) would be upset
 - b) find out why information was withheld
 - c) would not care
 - d) other
18. Why did you choose the statement you did?
- a) info is important
 - b) my family is open
 - c) the most direct/efficient way
 - d) other

APPENDIX C

ONLINE RECRUITMENT MESSAGE

My name is Shelly Hovick and I am a PhD student at the University of Georgia. I am seeking participants for a research study on family health information. As you and your fiancé prepare for your life together, the topic of health has probably come up. You might have shared information about your own health or about illnesses that run in your families. This can be important information, as health problems that run in your family may increase your own risk. But, have you ever stopped to think about how much you really know about your family's health? I hope you and your fiancé will each take this survey! The survey assesses what you know about your family's health and your willingness to find out more information. You can also enter to win a \$100 gift certificate from Bed Bath and Beyond. Participation in the survey not required to enter the drawing. To access the survey, click on or paste the following link:

https://www.surveymonkey.com/s.aspx?sm=XOvdHPdGtfxnSqsTpaSevw_3d_3d.

I would be happy to answer any questions you may have about the study or your participation. My contact information is listed below. Thank you!

Shelly Hovick

Department of Speech Communication

University of Georgia

(706) 542-1000

srhovick@uga.edu

APPENDIX D

MAIN STUDY SURVEY INSTRUMENT

Here we go!

Your family health history can show you what health conditions you might be at risk for and may be good topic for discussion between you and your fiancé. However, many people do not know or have never asked about their family's health.

You should have health information for your immediate family as well as your grandparents, aunts and uncles, nieces and nephews, and cousins. This information should go back 2-3 generations. It is also helpful to have information about health problems and the age they occurred, as well as lifestyle factors like smoking or being overweight.

This survey starts by asking you a few questions about your family health history. If you prefer not to answer a question just check "I choose not to answer" or skip the question and keep going.

Information About You

1. I understand by completing this survey I agree to participate in this research.
(*subjects check "yes" to continue to survey questions*)
2. What is your current age? (skip if you choose not to answer)
3. What is your gender (please check)?
 - female
 - Male
 - I choose not to answer
4. What is your race or ethnicity?
 - Black or African American
 - Hispanic or Latino
 - American Indian or Alaskan Native
 - Asian
 - Native Hawaiian or Pacific Islander
 - Caucasian
 - Other
 - I choose not to answer

Your Family Health

5. Check the box if members of your family have had these health conditions.

| | Cancer | Heart Disease | Stroke | Diabetes | I don't know |
|-----------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| Mother | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Father | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Sister | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Brother | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Mother's Mother | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Mother's Father | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Father's Mother | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Father's Father | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

6. For the boxes you just checked, do you know the exact age when the family member was first diagnosed with the condition?

- I know for all of them
- I know for some of them
- I don't know
- Not applicable
- I choose not to answer.

7. If your mother or father's parents (your grandparents) are no longer living, do you know the specific health conditions (not just "old age") that they died of?

- I know for all
- I know for some
- I don't know
- Not applicable
- I choose not to answer

8. Are any of your GREAT grandparents still living?

- All are living
- Some are living
- None are living
- I don't know
- I choose not to answer

9. Do you know the specific conditions (not just "old age") that your GREAT grandparents died of?

- I have this information for all great grandparents
- I have the information for some great grandparents
- I do not have this information
- My great grandparents are still living
- I choose not to answer

10. Do you know of any aunts (on either side) who had cancer, heart disease, stroke, or diabetes?
- I know for all
 - I know for some
 - I don't know
 - Not applicable
 - I choose not to answer

11. Do you know of any uncles (on either side) who had cancer, heart disease, stroke, or diabetes?
- I know for all
 - I know for some
 - I don't know
 - Not applicable
 - I choose not to answer

12. Did any of your cousins have cancer, heart disease, stroke, or diabetes?
- Yes
 - No
 - I know for some, but not others
 - I Don't know
 - Not applicable
 - I choose not to answer

13. In the past, what situations have prompted family discussions about family health history? (check all that apply)
- Health problems or illnesses
 - Death
 - Pregnancy or childbirth
 - Genetic Test
 - Marriage
 - A Family Gathering
 - Family member saw something in the media about health
 - Family member asked about it
 - I don't remember my family talking about health history
 - Other (please specify)

What you know about your family's health.

You will now be asked a series of questions about the family health information you have and need. All questions are on a 1-7 scale. If you choose not to answer a question, you may skip the question.

14. How much do you know about your family's health history?

nothing 1 2 3 4 5 6 7 everything

23. I feel anxiety about my family health history because there is a chance I might be at risk for a disease.

| | | | | | | | | |
|-------------------|---|---|---|---|---|---|---|----------------|
| strongly disagree | 1 | 2 | 3 | 4 | 5 | 6 | 7 | strongly agree |
|-------------------|---|---|---|---|---|---|---|----------------|

24. The thought of talking to family members about health history makes me worried.

| | | | | | | | | |
|-------------------|---|---|---|---|---|---|---|----------------|
| strongly disagree | 1 | 2 | 3 | 4 | 5 | 6 | 7 | strongly agree |
|-------------------|---|---|---|---|---|---|---|----------------|

25. Thinking I could be at risk for a disease because of my family health history

| | | | | | | | | |
|-------------------|---|---|---|---|---|---|---|----------------|
| strongly disagree | 1 | 2 | 3 | 4 | 5 | 6 | 7 | strongly agree |
|-------------------|---|---|---|---|---|---|---|----------------|

26. I am worried about my health because of my family health history.

| | | | | | | | | |
|-------------------|---|---|---|---|---|---|---|----------------|
| strongly disagree | 1 | 2 | 3 | 4 | 5 | 6 | 7 | strongly agree |
|-------------------|---|---|---|---|---|---|---|----------------|

27. I have some anxiety about talking to my family about family health history.

| | | | | | | | | |
|-------------------|---|---|---|---|---|---|---|----------------|
| strongly disagree | 1 | 2 | 3 | 4 | 5 | 6 | 7 | strongly agree |
|-------------------|---|---|---|---|---|---|---|----------------|

28. The gap between how much I know and how much I would like to know about my family health history makes me nervous.

| | | | | | | | | |
|-------------------|---|---|---|---|---|---|---|----------------|
| strongly disagree | 1 | 2 | 3 | 4 | 5 | 6 | 7 | strongly agree |
|-------------------|---|---|---|---|---|---|---|----------------|

How important is it to you?

29. It is important to me that I know my family health history.

| | | | | | | | | |
|-------------------|---|---|---|---|---|---|---|----------------|
| strongly disagree | 1 | 2 | 3 | 4 | 5 | 6 | 7 | strongly agree |
|-------------------|---|---|---|---|---|---|---|----------------|

30. It is important to me that I discuss family health history with my family.

| | | | | | | | | |
|-------------------|---|---|---|---|---|---|---|----------------|
| strongly disagree | 1 | 2 | 3 | 4 | 5 | 6 | 7 | strongly agree |
|-------------------|---|---|---|---|---|---|---|----------------|

31. The issue of family health history is especially important to me right now.

strongly disagree 1 2 3 4 5 6 7 strongly agree

Talking to my Family

32. Asking my family about our health history would produce _____.

a lot more
negatives
than positives

as many
negatives as
positives

a lot more
positives
than
negatives

-3 -2 -1 0 1 2 3

33. Talking with my family about our health history would produce _____.

a lot more
negatives
than positives

as many
negatives as
positives

a lot more
positives
than
negatives

-3 -2 -1 0 1 2 3

34. If you wanted to learn more about your family health history, which family members would you approach first? Please pick your top three

| | Approach 1 st | Approach 2 nd | Approach 3 rd |
|-------------------|--------------------------|--------------------------|--------------------------|
| Mother | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Father | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Sister | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Brother | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| aunt | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| uncle | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| grandmother | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| grandfather | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| great grandmother | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| great grandfather | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| male cousin | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| female cousin | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Talking to my Family

35. I know how to talk to my family about family health history.

strongly disagree 1 2 3 4 5 6 7 strongly agree

36. I know what to say to get health history information from my family.

| | | | | | | | | |
|-------------------|---|---|---|---|---|---|---|----------------|
| strongly disagree | 1 | 2 | 3 | 4 | 5 | 6 | 7 | strongly agree |
|-------------------|---|---|---|---|---|---|---|----------------|

37. My family would be completely honest about our family health history.

| | | | | | | | | |
|-------------------|---|---|---|---|---|---|---|----------------|
| strongly disagree | 1 | 2 | 3 | 4 | 5 | 6 | 7 | strongly agree |
|-------------------|---|---|---|---|---|---|---|----------------|

38. I am able to ask my family about health history.

| | | | | | | | | |
|-------------------|---|---|---|---|---|---|---|----------------|
| strongly disagree | 1 | 2 | 3 | 4 | 5 | 6 | 7 | strongly agree |
|-------------------|---|---|---|---|---|---|---|----------------|

39. My family can provide me with information about my family health history.

| | | | | | | | | |
|-------------------|---|---|---|---|---|---|---|----------------|
| strongly disagree | 1 | 2 | 3 | 4 | 5 | 6 | 7 | strongly agree |
|-------------------|---|---|---|---|---|---|---|----------------|

40. I am confident I can approach members of my family to talk about family health

| | | | | | | | | |
|-------------------|---|---|---|---|---|---|---|----------------|
| strongly disagree | 1 | 2 | 3 | 4 | 5 | 6 | 7 | strongly agree |
|-------------------|---|---|---|---|---|---|---|----------------|

41. My family has complete information about our family health history.

| | | | | | | | | |
|-------------------|---|---|---|---|---|---|---|----------------|
| strongly disagree | 1 | 2 | 3 | 4 | 5 | 6 | 7 | strongly agree |
|-------------------|---|---|---|---|---|---|---|----------------|

42. My family members would tell me everything they know about our family health history?

| | | | | | | | | |
|-------------------|---|---|---|---|---|---|---|----------------|
| strongly disagree | 1 | 2 | 3 | 4 | 5 | 6 | 7 | strongly agree |
|-------------------|---|---|---|---|---|---|---|----------------|

How would you respond?

43. Imagine that some family members become upset with you for asking them about family health history and called you nosy. How well would you cope with this sort of reaction?

| | | | | | | | | |
|----------------|---|---|---|---|---|---|---|----------------------------|
| could not cope | 1 | 2 | 3 | 4 | 5 | 6 | 7 | could cope perfectly well. |
|----------------|---|---|---|---|---|---|---|----------------------------|

44. How likely is it that your family would react this way?

| | | | | | | | | |
|-------------------|---|---|---|---|---|---|---|-------------------|
| not at all likely | 1 | 2 | 3 | 4 | 5 | 6 | 7 | completely likely |
|-------------------|---|---|---|---|---|---|---|-------------------|

45. Imagine that talking to family members about health history goes so well that others offer to help gather information. How would you cope with this sort of outcome?

| | | | | | | | | |
|----------------|---|---|---|---|---|---|---|----------------------------|
| could not cope | 1 | 2 | 3 | 4 | 5 | 6 | 7 | could cope perfectly well. |
|----------------|---|---|---|---|---|---|---|----------------------------|

APPENDIX E
SURVEY INTER-ITEM CORRELATIONS

Table E.1

Survey Inter-Item Correlations

| Question # | Uncertainty | | | | | | | | | | | |
|------------|------------------|------|------|--------------|------|------|----------------|------|------|----------------|------|------|
| | Discrepancy (UD) | | | Anxiety (UD) | | | Anxiety (Info) | | | Anxiety (Risk) | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| 1. Q15-Q14 | -- | 0.52 | 0.44 | | | | | | | | | |
| 2. Q16 | | -- | 0.37 | | | | | | | | | |
| 3. Q17 | | | -- | | | | | | | | | |
| 4. Q20 | | | | -- | 0.63 | 0.62 | | | | | | |
| 5. Q22 | | | | | -- | 0.63 | | | | | | |
| 6. Q28 | | | | | | -- | | | | | | |
| 7. Q21 | | | | | | | -- | 0.73 | 0.74 | | | |
| 8. Q24 | | | | | | | | -- | 0.74 | | | |
| 9. Q27 | | | | | | | | | -- | | | |
| 10. Q23 | | | | | | | | | | -- | 0.62 | 0.53 |
| 11. Q24 | | | | | | | | | | | -- | 0.64 |
| 12. Q27 | | | | | | | | | | | | -- |

(table continues)

Table E.1 (continued)

Survey Inter-Item Correlations

| Question # | Issue | | Outcome | | | | Target Ability | | | |
|------------|------------|-----|--------------|------|------------------------|------|----------------|------|----|------|
| | Importance | | Expectancies | | Communication Efficacy | | | | | |
| | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 |
| 13. Q29 | -- | .87 | | | | | | | | |
| 14. Q30* | | -- | | | | | | | | |
| 15. Q32 | | | -- | 0.93 | | | | | | |
| 16. Q33* | | | | -- | | | | | | |
| 17. Q35* | | | | | -- | 0.88 | 0.69 | 0.64 | | |
| 18. Q36 | | | | | | -- | 0.70 | 0.65 | | |
| 19. Q38 | | | | | | | -- | 0.76 | | |
| 20. Q40 | | | | | | | | -- | | |
| 21. Q39 | | | | | | | | | -- | 0.68 |
| 22. Q41* | | | | | | | | | | -- |

(table continues)

Table E.1 (continued)

Survey Inter-Item Correlations

| Question # | Target Honesty | | Positive Coping | | Negative Coping | | | |
|------------|----------------|------|-----------------|------|-----------------|------|------|------|
| | | | Efficacy | | Efficacy | | | |
| | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
| 23. Q37 | -- | 0.67 | | | | | | |
| 24. Q42 | | -- | | | | | | |
| 25. Q45 | | | -- | 0.54 | | | | |
| 26. Q51 | | | | -- | | | | |
| 27. Q43 | | | | | -- | 0.48 | 0.46 | 0.40 |
| 28. Q47 | | | | | | -- | 0.53 | 0.48 |
| 29. Q49 | | | | | | | -- | 0.47 |
| 30. Q53 | | | | | | | | -- |

(table continues)

Table E.1 (continued)

Survey Inter-Item Correlations

| Question # | Direct Information | | | Indirect Information | | | Avoidance | | |
|------------|--------------------|------|------|----------------------|------|------|-----------|------|------|
| | Seeking | | | Seeking | | | Avoidance | | |
| | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 |
| 31. Q56 | -- | 0.74 | 0.76 | | | | | | |
| 32. Q60 | | -- | 0.74 | | | | | | |
| 33. Q63 | | | -- | | | | | | |
| 34. Q55 | | | | -- | 0.14 | 0.18 | | | |
| 35. Q58 | | | | | -- | 0.29 | | | |
| 36. Q62 | | | | | | -- | | | |
| 37. Q57 | | | | | | | -- | 0.60 | 0.47 |
| 38. Q59 | | | | | | | | -- | 0.53 |

* Indicates an item was dropped from the analysis