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Moderating the effectiveness of messages to promote physical activity in type 2 diabetes

Rachel E. Myers

University of South Florida

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Moderating the Effectiveness of Messages to Promote Physical Activity in Type 2

Diabetes

by

Rachel E. Myers

A dissertation submitted in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy
College of Nursing
University of South Florida

Major Professor: Jason W. Beckstead, Ph.D.
Mary E. Evans, Ph.D., RN, FAAN
Frances M. Rankin, Ph.D., ARNP, FAANP
William P. Sacco, Ph.D.

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Dedication

To my husband Alan . . .

for always being there to encourage, support, and believe in me . . .
for motivating me to persevere towards my goals and to never give up . . .
for being unselfish and making sacrifices so that I could fulfill my dreams . . .
for loving me unconditionally and accepting me for who I am . . .
for simply being you – a lifetime partner, best friend, and soul mate.

To my parents and other family members . . .

whose love, support, and encouragement helped carry me along this journey.

To my cats Oreo and Goober . . .

who made me laugh when I wanted to cry and who helped remind me to
relax and enjoy the simple things in life.

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Moderating the Effectiveness of Messages to Promote Physical Activity in Type 2

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Abstract

The world is experiencing a rapid rise in chronic health problems, which places an enormous burden on health care services. Modifiable health behaviors such as physical inactivity are largely responsible for this high prevalence and incidence of chronic diseases. Message tailoring is a well-established approach for constructing health communication and has been shown to increase the persuasiveness of messages in the promotion of healthy behaviors. Message framing is an effective strategy that has been well-studied in psychology over the past 20-plus years across a breadth of health-related behaviors but has received little attention in the nursing research literature. Based on prospect theory, temporal construal theory, and motivational orientation theories, the present study examined how two individual differences factors – consideration of future consequences (CFC) and motivational orientation – combine to moderate temporal proximity and valence framing effects on intentions to increase physical activity. A mail survey was conducted using Dillman’s Tailored Design Method. Two hundred and eighteen adults with type 2 diabetes were randomly assigned to receive one of four versions of a health message aimed to increase regular physical activity. Messages were

framed using a 2 (immediate- vs. distal-framed) x 2 (gain- vs. loss-framed) design. After reading the message, participants rated their intention to increase physical activity. They also completed a measure of CFC and two measures of motivational orientation.

Participants who read a message with a temporal proximity or valence frame congruent with their CFC or motivational orientation, respectively, did not show greater intentions to increase physical activity when compared to those who read a health message that was incongruent with these individual differences. Plausible explanations for these negative results are considered. Several interesting findings emerged from supplemental analyses. For instance, participants who perceived the health message as more believable tended to have greater intentions to increase physical activity. Suggestions for future research applying message congruence to promote complex health behaviors in at-risk populations are given. Implications of message framing and other message tailoring strategies for nursing research, education, and practice are discussed.

Chapter 1:

Introduction

Identification of the Problem

The world is experiencing a rapid rise in chronic health problems, which places an enormous burden on health care services (World Health Organization [WHO], 2005a). In 2005, an estimated 60% (35 million) of all global deaths were due to chronic diseases, primarily diabetes mellitus (DM) and cardiovascular diseases (32%), cancers (13%), and chronic respiratory diseases (7%) (Abegunde, Mathers, Adam, Ortegón, & Strong, 2007). Chronic diseases also place a grave economic burden on nations (Centers for Disease Control and Prevention [CDC], 2009a; WHO, 2005b). The WHO (2005a) calls for the health care workforce to transition from a traditional provider-centered approach to a contemporary patient-centered approach in order to lessen the occurrence and detrimental impact of these worldwide burdens. For example, it is estimated that at least 80% of all type 2 DM and cardiovascular disease and over 40% of cancer can be prevented through changes in behavior (WHO, 2005b). Physical inactivity, unhealthy diet, and tobacco use are three examples of modifiable behaviors that contribute to the prevalence of chronic diseases. A patient-centered approach, where care is coordinated across time and centered around patients' needs, values, and preferences, strengthens patients' role in managing

their health problems by empowering them to become active decision makers rather than just passive recipients of care (WHO, 2005a).

Health education and self-management/self-care training, with an emphasis on promoting healthy behaviors to prevent future problems, are vital components of a patient-centered approach. This education and training may be informal (e.g., unplanned and unstructured during a clinic visit) or formal (e.g., structured group diabetes class) and range from simple (e.g., distribution of written materials) to complex (e.g., teaching patients self-blood glucose monitoring skills). Nurses play an essential part in delivering such education and training, both independently and alongside other health care providers. Nurses are well placed and have extensive opportunities to deliver patient education and training in a variety of settings (Coster & Norman, 2009). Studies have revealed that nurses are perceived as credible sources of health information. For example, Jones, Sinclair, and Courneya (2003) conducted a pilot study and found that Registered Nurses (RNs) were not only perceived as credible sources but that this credibility did not differ from that of physicians. Research has also shown that patients find nurses easier to approach for health information than physicians. For example, Collins (2005) explored both nurse- and physician-patient communications and found that overall, patients more openly and freely communicated with nurses.

Despite the fact that patient education and training are well-established key features of nursing and that nurses recognize these as important functions of their role, nurses often report difficulty providing education and training (see Coster & Norman, 2009; Kim, Heerey, & Kols, 2008). Lack of time is a common barrier to effective nurse-patient communication. Nurses may only have a few minutes to deliver an important

health education message. How should nurses go about getting their message across to their patients to maximally promote healthy behaviors? What well-established, empirically tested, effective strategies can nurses employ to help them successfully achieve this goal? The field of health psychology offers a theoretical and conceptual framework from which nursing can draw to answer these questions (Myers, 2010). Health psychology emphasizes health promotion and disease prevention and focuses on the development of theoretical constructs and empirically derived principles of behavior change (Matarazzo, 1980, 1982). Health psychology is also devoted to “understanding psychological influences on how people stay healthy, why they become ill, and how they respond when they do get ill” (Taylor, 2003, p. 17). Myers and Beckstead (2009) present an overview of the field of health psychology and highlight health psychology’s utility for nursing research, education, and practice by providing examples of applications in nursing.

Health Communication

Message tailoring. Health behaviors and habits are complex, are determined by the interplay of multiple factors, and are resistant to change (see Rodin & Salovey, 1989; Taylor, 2003). Effective health communication uses theoretical-based behavior modification principles to inform and influence individual and community decisions that enhance health (U.S. Department of Health and Human Services [DHHS], 2000b). Message tailoring is a health communication strategy that involves the customization of information interventions to best fit the characteristics and needs of specific target populations or individuals (Kreuter & Wray, 2003; Salovey, 2005). There is empirical evidence that tailored health messages, compared to general, non-tailored health

messages, are more persuasive and effective in promoting behavior change through various mechanisms such as enhanced salience and stimulation of greater cognitive activity or elaboration (e.g., Kreuter, Bull, Clark, & Oswald, 1999; Kreuter & Wray, 2003; Latimer, Katulak, Mowad, & Salovey, 2005). Nurses have long recognized the value of enhancing nurse-patient communication and of utilizing approaches such as message tailoring (although not always labeled as such) in nursing interventions (e.g., Coster & Norman, 2009; Kim et al., 08; Shin, Hur, Pender, Jang, & Kim, 2006).

Message framing: Message framing is a widely studied method of message tailoring; over 150 studies have examined message framing effects on the promotion of self-care behaviors (see Kühberger, 1998; O’Keefe & Jensen, 2006, 2007). Rothman and Salovey (1997) draw on Kahneman and Tversky’s (1979) prospect theory and describe message framing as a strategy that involves manipulating how information is presented to affect people’s decisions and promote a specific behavior. Content of messages may be presented or “framed” in various ways, usually by valence – emphasis on benefits (gains) or costs (losses) associated with health behaviors. Gain-framed messages present benefits achieved by adopting a target behavior, whereas loss-framed messages convey costs of not adopting the target behavior (Salovey, 2005). Nearly all health-related information can be framed in terms of gains and/or losses. In addition to valence, a message’s temporal proximity – distance between performance of health behaviors and attainment of expected outcomes (immediate/short-term or distal/long-term) - can be manipulated. Predictions of valence framing and temporal proximity framing effects on health behaviors are often based on tenets from prospect theory (Kahneman & Tversky, 1979)

and temporal construal theory (TCT) (Liberman & Trope, 1998; Trope & Liberman, 2000), respectively. These theories will be explained in Chapter 2.

Early studies tested only main effects of framing manipulations on health behaviors, but this approach was overly simplistic and contributed to discordant findings (Myers, 2010). More recently, research has focused on testing potential moderating variables that influence message framing effects. These moderators can typically be categorized as situational or dispositional (individual differences). Historically, nurses have recognized individual differences in patients (e.g., temperament or intelligence) and the impact these characteristics have on patients' self-care behaviors.

Moderators of framing effects. Consideration of future consequences (CFC) and motivational orientation are two moderators of framing effects that have been examined in the literature. These are described below.

Consideration of future consequences. CFC, a cognitive mindset, refers to the extent to which people consider distant outcomes of their current behaviors and the extent to which people are influenced by these considerations (Strathman, Gleicher, Boninger, & Edwards, 1994). Tenets from TCT (Liberman & Trope, 1998; Trope & Liberman, 2000) help explain CFC effects on health behavior decisions. Strathman et al. (1994) hypothesized people low in CFC will focus more on immediate needs and concerns, acting to satisfy these and devaluing distant outcomes. Conversely, people high in CFC will consider future implications of behavior and act in accordance with distant goals. CFC has been found to moderate message framing effects such as temporal proximity. For example, people high in CFC reported greater intentions to use sunscreen when positive outcomes were presented as distal and negative outcomes were presented as

immediate; the opposite was true for people low in CFC (Orbell & Kyriakaki, 2008). Nurse researchers recognize that many, if not most, behaviors result in short and long-term health consequences and have examined constructs similar to CFC such as subjective time experience (e.g., Sanders, 1986; Strumpf, 1987), future time perspective (e.g., Rew, Fouladi, & Yockey, 2002), and health temporal orientation (e.g., Russell, Champion, & Perkins, 2003; Russell, Perkins, Zollinger, & Champion, 2006).

Motivational orientation. Motivational orientation evolved from and varies across several motivational theories. For example, some theories posit that “approach-orientation” and “avoidance-orientation” are two distinct motivational styles that influence decisions and behaviors; “approachers” respond more to rewards or incentives, whereas “avoiders” respond more to punishment or threat (see Carver, Sutton, & Scheier, 2000, for a review). Other theories (e.g., Higgins, 1997, 1998, 1999) posit that goal orientation guides decision making and behaviors; people with a promotion-focus (“promoters”) pursue goals in a manner that ensures presence of positive outcomes, whereas people with a prevention-focus (“preventers”) pursue goals in a manner that ensures absence of negative outcomes. These two ideas appear related: an approach strategy is usually taken for promotion, and an avoidance strategy is usually taken for prevention (Higgins, 1997; Higgins et al., 2001). Similar behavioral predictions about message framing effects have been made for approach-oriented and promotion-focused people, as well as for avoidance-oriented and prevention-focused people (e.g., Lee & Aaker, 2004; Mann, Sherman, & Updegraff, 2004; Rothman, Wlaschin, Bartels, Latimer, & Salovey, 2008). Although these two ideas have been examined in separate studies, no health behavior study has drawn from an at-risk community population to simultaneously

examine both constructs in the same sample. Motivational orientation has been found to moderate message framing effects such as valence. For example, “avoiders” (Mann et al., 2004) and “preventers” (Uskul, Sherman, & Fitzgibbon, 2009) were more persuaded by loss-framed messages related to dental flossing, whereas “approachers” (Mann et al., 2004) and “promoters” (Uskul et al., 2009) were more persuaded by gain-framed messages.

Physical Activity

According to the U.S. DHHS (2008), physical activity is defined as any bodily movement created by skeletal muscle contraction that increases energy expenditure above a basal level, but it is often generally referred to as health-enhancing activity. People who engage in only baseline activity (sedentary or light-intensity activities of daily life such as sitting, standing, slowly walking, or lifting lightweight objects) are considered physically inactive. Health-enhancing physical activity (e.g., brisk walking, dancing, weight-lifting) is activity that, when added to baseline activity, produces health benefits. Physical activity can also yield other benefits such as providing opportunities to have fun, to be with friends, and to improve physical appearance. Exercise is a form of physical activity but is narrower in scope. Exercise is planned, structured, repetitive, and purposive with an overall goal to improve or maintain physical performance, fitness, or health. All exercise is physical activity, but not all physical activity is exercise.

The U.S. DHHS’ (2008) *Physical Activity Guidelines for Americans* suggest adults aged 18 years and older should perform at least 150 minutes per week of moderate-intensity (e.g., brisk walking) or 75 minutes per week of vigorous-intensity (e.g., running or jogging) aerobic physical activity or an equivalent combination of the

two. The guidelines also recommend adults should engage in muscle-strengthening activities that work all major muscle groups and involve moderate to high levels of intensity two or more days per week (e.g., resistance-training or weight-lifting). Adults aged 65 years and older or with disabilities are encouraged to follow the adult guidelines if possible or to be as physically active as their abilities and conditions allow.

Regular physical activity is a well-established essential component of an overall healthy lifestyle that contributes to the promotion of health (e.g., increased energy, improved sleep, enhanced cognitive function) and the prevention of disease (e.g., type 2 DM, cardiovascular disease, high blood pressure). Being physically active is one of the most important steps Americans of all ages can take to improve their health and fitness (U.S. DHHS, 2008). Despite this common knowledge, many people remain inactive. According to the 2009 Behavioral Risk Factor Surveillance System (BRFSS) annual survey data (CDC, 2010), 49% of Americans did not meet the minimum recommendations for moderate or vigorous physical activity, and approximately 24% reported doing no physical activity in the preceding month.

Call for Research

Although effective health communication is a widely recognized health behavior modification approach, the U.S. DHHS (1996, 2000b, 2000c) reported existing health communication efforts to increase healthy behaviors such as physical activity have fallen short of achieving their intended goals. Health communication, DM, and physical activity are 3 of the 28 focus areas in the U.S. Healthy 2010 initiative (U.S. DHHS, 2000a, 2000b, 2000c). The initiative calls for an increase in health communication evaluation

and research aimed at enhancing health care providers' communication skills so that providers may design and deliver more effective messages to promote behavior changes.

The Present Study

The present study responded to the U.S. Healthy 2010 initiative's call for research (U.S. DHHS, 2000a, 2000b, 2000c) by examining two moderating factors that may help optimize message tailoring effects (specifically "framing") on the promotion of physical activity in adults with type 2 DM. The present study attempted to replicate previous findings and extend these findings by exploring interactions not previously tested in message framing research. A summary of the key concepts and their hypothesized interrelationships is shown in Figure 1. The study was also novel in that it examined these relationships in an at-risk community population not previously targeted.

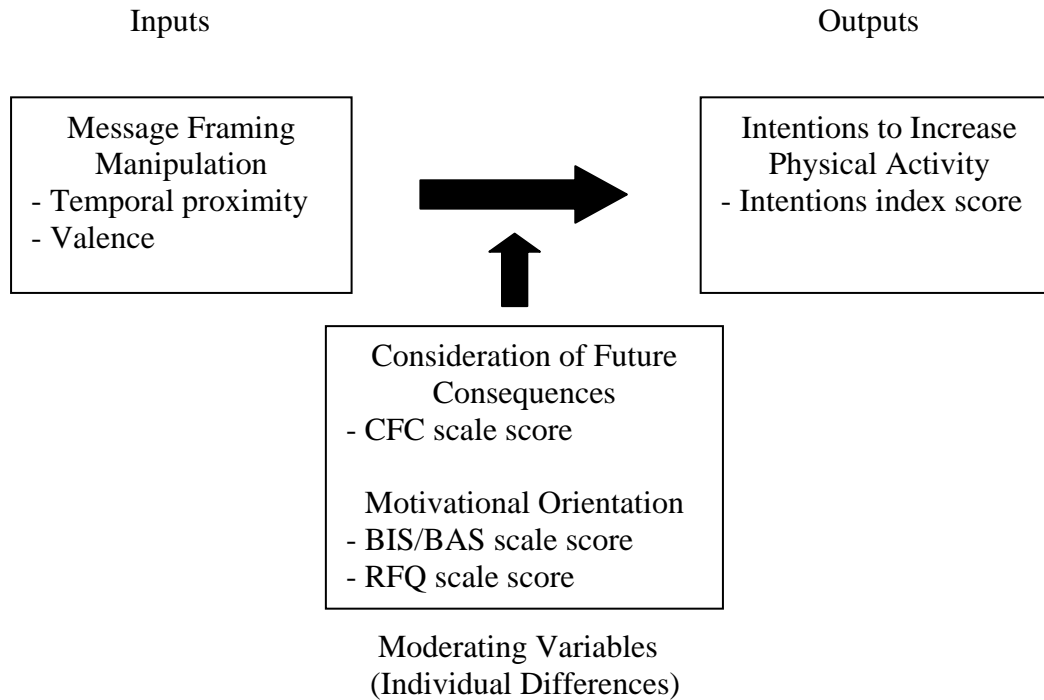


Figure 1. Logic Model of the Present Study. CFC = Consideration of Future Consequences; BIS/BAS = Behavioral Inhibition System/Behavioral Activation System; RFQ = Regulatory Focus Questionnaire.

Purpose, specific aims, and hypotheses. The overall purpose of the present study was to employ a multi-theoretical, integrated approach to message framing and to examine its effects on health behaviors. More specifically, the aim was to examine how two individual differences factors - CFC and motivational orientation - may combine to moderate framing effects (temporal proximity and valence) on intentions to increase physical activity. Based on the logic model in Figure 1 and the literature that will be reviewed in Chapter 2, the following hypotheses were posited:

- H1. When valence of the message is congruent with individuals' motivational orientation (i.e., gain-framed :: approach-oriented/promotion-focused, and loss-framed :: avoidance-oriented/prevention-focused) intentions to increase physical

activity will be greater than when the message is incongruent with individuals' motivational orientation.

- H2. When temporal proximity of the message is congruent with individuals' status on CFC (i.e., immediate-framed :: low CFC, and distal-framed :: high CFC) intentions to increase physical activity will be greater than when the message is incongruent with individuals' CFC.
- H3. When *both* valence and temporal proximity of the message are congruent with individuals' motivational orientation *and* CFC standing, intentions to increase physical activity will be at their highest.

Targeted population. The targeted population in the present study was adults with type 2 DM. In the United States alone, an estimated 23.6 million people – 7.8% of the population – have DM; type 2 diabetes accounts for 90-95% of all diagnosed cases in adults; and approximately \$174 billion was spent on diabetes costs in 2007 (National Institute of Diabetes and Digestive and Kidney Diseases [NIDDK], 2008). Physical inactivity is one of several modifiable health behaviors that contribute to the prevalence of type 2 DM (WHO, 2005b). Based on the U.S. DHHS' (2008) *Physical Activity Guidelines for Americans* and empirical studies, the American Diabetes Association (ADA, 2010) recommends people with diabetes perform at least 150 minutes per week of moderate-intensity aerobic physical activity. In addition, people with type 2 DM (in the absence of contraindications) are encouraged to engage in resistance training three times per week (ADA, 2010). It is well-established that regular physical activity is an effective diabetes self-care strategy that will contribute to the attainment of several individual health benefits (e.g., improved blood glucose control, weight loss), the optimization of

overall management of the disease, and a reduction in the national economic burden of diabetes costs.

Chapter Summary

Modifiable health behaviors are largely responsible for high prevalence and incidence of chronic diseases such as type 2 DM (WHO, 2005b). Physical activity yields multiple health benefits and is an essential self-care component of DM management (ADA, 2010; U.S. DHHS, 1996, 2008). However, many people with DM remain physically inactive. The present study draws from prospect theory, TCT, and motivation theories as a conceptual framework to test how two individual differences factors - CFC and motivational orientation – may combine to moderate framing effects (temporal proximity and valence) on intentions to increase physical activity in adults with type 2 DM. A multi-theoretical, integrated approach was used to provide a richer, fuller understanding of framing effects on health behaviors and to guide nurses and other health care providers in designing and delivering effectively tailored health messages to promote healthy self-care behaviors.

Chapter 2:

Review of Literature

This chapter presents the definitions, typologies, and origins of message framing, theoretical and conceptual frameworks of message framing research, examples of empirical studies from the message framing literature pertinent to the present study, a summary of three meta-analytic reviews on message framing, and a synopsis of the current state of the message framing literature pertaining to health-related behaviors.

Message Framing Definitions and Typologies

Message framing involves manipulating the context in which information is considered when presented. The ultimate goal of message framing is usually to promote a particular behavior (Rothman & Salovey, 1997). Message framing effects are complex, and the empirical literature lacks consistency, as later described. These discrepant findings may partially be attributed to the absence of a universal operational definition of message framing. Instead, a variety of definitions exist (Wilson, Purdon, & Wallston, 1988), ranging from “loose” to “strict” interpretations (Kühberger, 1998). Researchers have developed typologies/classification schemes of message framing in an attempt to operationally define it and demonstrate various ways to frame messages (e.g., Fagley, 1993; Levin, Schneider, & Gaeth, 1998; Rothman & Salovey, 1997; Rothman, Salovey, Antone, Keough, & Martin, 1993; Tversky & Kahneman, 1981; Wilson et al., 1988).

These various definitions and typologies reveal that messages can be framed in more than one way, but most commonly they are framed by valence - in terms of gains (benefits) or in terms of losses (costs). Gain-framed messages typically present benefits achieved by adopting a target behavior, whereas loss-framed messages usually convey costs of not adopting the target behavior (Rothman & Salovey, 1997; Salovey, 2005). Nearly all health-related information can be framed in terms of gains and/or losses. In addition, messages can be framed by temporal proximity, where the expected outcomes of the health behavior (benefits and/or losses) are presented as occurring immediately (short-term) or distally (long-term). The present study and corresponding review of literature primarily focused on the valence and temporal proximity definitions of message framing.

Origins of Message Framing

Decision making under risk involves a choice between prospects or gambles. Historically, expected utility theory has dominated the analysis of decision making under risk (Kahneman & Tversky, 1979) and involves assigning expected values to final assets of prospects (choice options). The utilities of outcomes are weighted by their probabilities of occurrence and are used to determine the overall utility of each choice option (see Keeney & Raifa, 1976, and von Neumann & Morgenstern, 1944, for more details about expected utility theory). Kahneman and Tversky (1979) demonstrated several phenomena that systematically violate the basic tenets of expected utility theory and thus concluded that the expected utility theory was an inadequate descriptive model of decision making under risk. As a result, they proposed an alternative model of risky choice – prospect theory – to better understand preference and decision making under conditions of uncertainty.

In comparison to expected utility theory, prospect theory examines the subjective values and subjective probabilities of choice options rather than the objective outcomes of wealth and welfare. Kahneman and Tversky (1979) describe the risky choice process as consisting of two phases: editing and evaluation. The editing phase involves a preliminary analysis of all possible choices where options are organized and reformulated and outcomes are coded in terms of gains or losses, relative to a neutral reference point or asset position. The subsequent evaluation phase involves evaluating each edited option for overall value and choosing the option of highest value. Prospect theory proposes that when potential losses of a situation are made salient and behavioral choices involve risk or uncertainty, people are generally risk-seeking and will more likely assume these risks. Conversely, when potential gains of a situation are made salient and behavioral choices pose minimal risk or minimal uncertainty, people are generally risk-averse and will more likely act to avoid the risks (Kahneman & Tversky, 1979; Tversky & Kahneman, 1981).

Tversky and Kahneman (1981) introduced and tested how prospect theory could be applied to the framing of decisions by presenting a series of hypothetical decision problems to college students. Tversky and Kahneman (1981) describe a “decision problem” as one that can be defined by the options or acts people must choose from, the possible consequences or outcomes of these acts, and the conditional probabilities (contingencies) of outcomes occurring given a particular act. They use the term “decision frame” to refer to one’s conception of the acts, outcomes, and contingencies related to a specific choice. They propose several factors that influence which frame a decision-maker will adopt, including one’s cultural norms, habits, and personal characteristics and the formulation of the problem. Their overall findings supported basic tenets of prospect

theory. People tended to be sensitive to whether the valence of alternatives was framed in terms of associated costs or benefits when the situations were objectively equivalent.

The prototypical example of risky choice framing effects comes from Tversky and Kahneman's (1981) "Asian disease problem", in which a hypothetical disease was expected to kill 600 people. Different pairs of effectively identical alternative options for responding to the outbreak were presented to research participants, expressed as outcomes of either the number of lives saved (gain-framed) or lost (loss-framed). In addition, within each framing condition, the pair of options differed in terms of the probability (certain vs. uncertain) and magnitude (number or proportion of the lives) of the outcome. Consistent with prospect theory, the majority of respondents chose the risk-averse option when gains were certain (i.e., lives saved) and the risk-seeking option when losses were certain (i.e., lives lost). To illustrate, in the gain-framed condition, the prospect of saving 200 lives with certainty (risk-averse) was more appealing than a one-in-three chance of saving 600 lives and a two-in-three chance of saving no lives (risk-seeking). In the loss-framed condition, the one-in-three chance that nobody would die and the two-in-three chance that 600 people would die (risk-seeking) was more acceptable than the certain death of 400 people (risk-averse). Prospect theory and these early empirical findings laid the foundation for the future of message framing research.

Temporal construal theory (TCT) (Liberman & Trope, 1998; Trope & Liberman, 2000) has also guided message framing research, especially related to the manipulation of a health message's temporal proximity – the distance between performance of health behaviors and attainment of expected outcomes. TCT posits that temporal proximity systematically changes the way people represent (construe) certain actions (e.g., health

behaviors) and events (e.g., outcomes), which in turn alters how people evaluate, judge, and choose among these actions and events. According to TCT, people tend to use higher level (more schematic, abstract) construals to represent information about distant-future situations and lower level (less schematic, concrete) construals to represent information about immediate-future situations (Liberman & Trope, 1998; Trope & Liberman, 2000). To illustrate, a high-level construal may represent “engaging in regular physical activity” as “improving overall health and well-being,” whereas a low-level construal may represent the same behavior as “walking two miles a day on the treadmill at the gym.”

High- and low-level construals also differ in their emphasis on feasibility versus desirability and probability versus prize value. Feasibility refers to the ease or difficulty of reaching the outcome and represents a low-level construal. Conversely, desirability refers to the value of an action’s outcome (end-state) and represents a high-level construal (Liberman & Trope, 1998; Trope & Liberman, 2000). Sagristano, Trope, and Liberman (2002) applied the distinction between feasibility and desirability to gambles and found that people rated safe bets (high probability of winning a small prize value) as more appealing in the near-future and risky bets (low probability of winning but large prize value) as more appealing in the distant-future. Thus, they proposed that probability represents a low-level construal and prize value represents a high-level construal.

With regard to decision-making, TCT suggests that decisions about the immediate-future are largely influenced by low-level aspects (e.g., feasibility and probability) of the involved actions and events, whereas decisions about the distant-future are largely influenced by high-level aspects (e.g., desirability and prize value) (Liberman & Trope, 1998; Sagristano et al., 2002; Trope & Liberman, 2000). This suggestion may

help explain why people choose to remain physically inactive “today” despite the well-known benefits of regular physical activity “tomorrow”. People may perceive regular physical activity as having high desirability but low feasibility. With immediate-future decisions, feasibility often “trumps” desirability. People may be willing to sacrifice future benefits of being physically active such as more energy and a healthier heart (large prize value but abstract and less certain) in order to gain immediate benefits of not being physically active such as more time to watch television and play computer games (small prize value but concrete and more certain).

Other Theories and Conceptual Models of Message Framing in Health Research

Historically, prospect theory has been a primary framework for understanding preference and decision making under conditions of uncertainty and the dominant underlying theoretical perspective for message framing (Kahneman & Tversky, 1979, 1984; Tversky & Kahneman, 1981), as previously described. Empirical evidence suggests, however, that prospect theory does not solely explain the effects of message framing on all behaviors under all circumstances, specifically those regarding health-related behaviors (Levin et al., 1998; Rothman & Salovey, 1997; Wilson et al., 1988). The theory inadequately addresses the mechanisms and conditions under which message framing alters people’s attitudes, beliefs, and behaviors. Some researchers have found that prospect theory alone is insufficient and have offered alternative theoretical perspectives to help explain why people vary in their responses when presented with subjectively different but objectively equivalent descriptions of the same decision problem. A few of these alternative perspectives are described next.

Nearly all health-related information can be framed in terms of either benefits (gains) or costs (losses). However, the literature is replete with inconsistent findings, as later described. Rothman and Salovey (1997) offer potential explanations of how and why prospect theory may contribute to these inconsistent predictions. One plausible possibility is the unique differences between health-related decision problems and decision problems initially tested in prospect theory. First, health decision problems are often more realistic, dealing with personal issues rather than hypothetical public health issues. Second, health decision options are sometimes non-discrete and compound (i.e., may consist of more than two options). Third, perceived risk for health behavior decisions is more subjective because formal probabilities of outcomes occurring as a result of these decisions are often unknown. Fourth, in health behavior message framing research, experimenters often have less control over the situations in which framed messages are predicted to exert influence than initial researchers working in laboratory settings. This factor could undermine any systematic test of prospect theory's predictions and result in inconsistent patterns of findings in health behavior research. Rothman and Salovey (1997) conclude that despite limitations of prospect theory, its basic assumptions can be operationalized and tested in health behavior research if careful attention is paid to the context in which a health message is delivered.

Rothman and Salovey (1997) propose three stages in the decision-making process during which the relative influence of gain- and loss-framed messages may be examined. The likelihood that people respond to message framing in a manner consistent with prospect theory varies over these three stages. First, the amount of attention or cognitive processing people direct to the message can influence the degree to which they integrate

the message into a mental representation of the health issue. Second, people's receptivity to, or acceptance of, a particular frame that a message advocates can also affect framing effects, and people's past and current experiences influence this receptivity. Third, people's perceived function of the advocated health behavior (i.e., prevention, detection, or recuperative) can influence message framing effects.

Rothman et al. (1993) and Rothman and Salovey (1997) describe health behaviors as serving one of three functions: to "prevent" onset of a health problem (e.g., regular physical activity will help prevent high blood glucose), to "detect" the development of a health problem (e.g., self-monitoring of blood glucose will detect abnormal blood glucose levels), or to "cure or treat" an ongoing health problem (e.g., insulin administration will help keep blood glucose levels within the desired range). The effectiveness of message framing is partly based on whether taking action is perceived to involve risk or uncertainty. For example, people tend to perceive performance of a detection behavior as risky (e.g., it may reveal an unpleasant finding) and performance of a prevention behavior as relatively safe (e.g., it maintains one's health status). Based on theoretical principles and the empirical literature, Rothman and Salovey (1997) draw the following conclusions: loss-framed messages are predicted to be most effective in promoting detection behaviors and gain-framed messages are predicted to be most effective in promoting prevention behaviors. Many behaviors are typically construed as having just one function (i.e., prevention, detection, or curing), but some behaviors may be perceived as serving multiple functions. For example, some women may perceive undergoing a Papanicolaou (Pap) test as serving a detection function because it detects the presence or absence of cervical problems. However, some women may also perceive undergoing a

Pap test as serving a prevention function because if it reveals mild cervical abnormalities, early interventions can be done to try and prevent further, more severe abnormalities (e.g., cervical cancer).

Wilson et al. (1988) emphasize consequences as a central feature in theoretical frameworks of health-behavior change and identify two recurring dimensions associated with behavior change research that involve consequences: perceived value and perceived threat. Besides prospect theory, numerous theories emphasize perceptions of the value or threat of an outcome contained in a recommendation, such as the health belief model (Hochbaum, 1958; Rosenstock, 1960), health promotion model (Pender, 1982), theory of reasoned action (Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975), theory of planned behavior (Ajzen, 1985, 1988, 1991), and protection motivation theory (Rogers, 1975). Several researchers have integrated tenets from prospect theory with one or more of these other theories to study message framing effects on health behaviors (e.g., Jones, Sinclair, Rhodes, & Courneya, 2004; McCall & Martin Ginis, 2004).

Studies are also emerging that integrate persuasion theories with prospect theory. One example is Petty and Cacioppo's (1986) elaboration likelihood model (ELM) of persuasion effects. The basic premise of ELM is that a message's persuasive ability to influence a person's change in attitude about a particular issue or argument depends on how likely the person will elaborate upon (i.e., think about) this issue or argument. Several variables drawn from ELM have been shown to produce moderating effects on message framing. For example, Jones et al. (2003) found that source credibility moderates the effect of message framing on exercise intentions, exercise behaviors, and cognitive response/elaboration measures. People who received a gain-framed message

from a credible source elaborated the message the most and reported the greatest amount of exercise intentions and behaviors.

Studies are also emerging that integrate motivation theories with prospect theory. For example, according to several theories of motivation (see Carver et al., 2000, for a review), behavior is regulated by two distinct brain systems that guide responses to stimuli of reward and punishment: the behavioral activation system (BAS) and the behavioral inhibition system (BIS) (often referred to as the approach and avoidance systems, respectively). Both systems (presumably orthogonal) represent chronic dispositional motivation styles, where one system (BAS) regulates “appetitive” behavior toward actual or potential rewards and the other system (BIS) regulates “aversive” behavior away from potential threats or punishments (Carver & White, 1994; Gray, 1982, 1990). Therefore, people with a predominant approach-orientation (high BAS) should respond more to cues of reward or incentive, whereas people with a predominant avoidance-orientation (high BIS) should respond more to cues of punishment or threat (Carver et al., 2000).

Another example of motivation theory is the regulatory focus theory (Higgins, 1997, 1998, 1999), which predicts that goal orientation (or regulatory focus) is the dominant motivation system that guides decision-making and behavior. This theory distinguishes between two types (presumably orthogonal) of goal orientation: promotion-focus and prevention-focus. People with a promotion-focus (“promoters”) are motivated by advancement and accomplishment and eagerly pursue goals in a manner that ensures presence of positive outcomes (e.g., they regularly exercise to achieve optimal blood glucose control). People with a prevention-focus (“preventers”) are motivated by security

needs and vigilantly pursue goals in a manner that ensures absence of negative outcomes (e.g., they regularly exercise to avoid high blood glucose). The regulatory focus motivation system reflects specific types of desired end states (final outcomes) rather than broad dispositions as emphasized in the approach/avoidance system (Higgins, 1997). Although regulatory focus is posited to be a stable dispositional characteristic, situational variables may also temporarily induce a prevention- or promotion-focused mindset (Higgins, 1997; Higgins et al., 2001).

Rothman, Bartels, Wlaschin, and Salovey (2006) and Rothman et al. (2008) provide a new conceptualization of framing effects on health behaviors. They acknowledge two dominant perspectives that to date have guided researchers in understanding the conditions under which gain- and loss-framed messages should be maximally persuasive: situational factors (i.e., differences in health behavior's function) and dispositional factors (i.e., individual differences in sensitivity to favorable or unfavorable outcomes). Both factor types have been tested separately as potential moderators in regulating persuasiveness of gain- and loss-framed messages in the promotion of health behaviors. Rothman et al. (2006) and Rothman et al. (2008) suggest that both sets of moderating factors may rest on a single set of underlying cognitive and affective processes, based on tenets of the regulatory focus theory, and thus propose the two factors should be measured simultaneously when testing message framing effects. They hypothesize that health behaviors can evoke either a promotion- or prevention-focus mindset, and this effect is influenced by both features of the behavioral domain and characteristics of the individual. More specifically, they predict when people consider performing a behavior intended to promote health (e.g., physical activity), people will

experience thoughts and feelings consistent with a promotion-focus mindset, whereas when people consider performing a behavior intended to detect the presence of a health problem (e.g., exercise stress test), people will experience thoughts and feelings consistent with a prevention-focus mindset. The variability in how people interpret a given behavior (as either promotion or detection) will moderate the relative effectiveness of the framed message. Consideration of this integrated approach of situational and dispositional factors has only recently appeared in the literature.

In summary, many theories and conceptual frameworks have been proposed to explain message framing effects on health behaviors. Early studies of message framing typically involved just one theoretical approach, namely prospect theory. More recently, studies have involved the integration of two or more theories. Strong evidence supports that no one theory or model can solely explain all the message framing effects found in the literature. Multi-theoretical integrated approaches are necessary to better understand the complexity of these effects.

Empirical Studies Involving Message Framing and Health Behaviors

Prospect theory was initially tested in laboratory settings using discrete choice decisions involving monetary outcomes (e.g., gambling and purchasing) and hypothetical situations. Since Tversky and Kahneman's (1981) original "Asian disease problem", many studies have used message framing to test the preference reversal prediction of prospect theory across a broader range of decision problems (Rothman et al., 1993). In particular, there has been a recent increase in the study of message framing effects on health behaviors.

Myers (2010) conducted a review of the literature to assess the current state of message framing research in health behaviors. She used three methods to locate relevant empirical studies: computerized database searches of CINAHL, PsycINFO, and PubMed, using “message framing” as a search term; examination of previous reviews and textbooks; and inspection of reference lists in previously located studies. She found that over the past 20 years, 25-plus health related behaviors have been studied in message framing research. Examples of these behaviors include smoking (e.g., Moorman & van den Putte, 2008), drinking (e.g., Gerend & Cullen, 2008), exercise/physical activity (e.g., Jones et al., 2003), eating habits/behaviors (e.g., Tykocinski, Higgins, & Chaiken, 1994), dental hygiene (e.g., Sherman, Mann, & Updegraff, 2006), health information seeking (O’Connor, Warttig, Conner, & Lawton, 2009), sexual health promotion (e.g., O’Connor, Ferguson, & O’Connor, 2005), HIV testing (e.g., Apanovitch, McCarthy, & Salovey, 2003), breastfeeding (e.g., Wolf, 2007), prostate exams (e.g., Cherubini, Rumiati, Rossi, Nigro, & Calabro, 2005), testicle self-exams (e.g., Steffen, Sternberg, Teegarden, & Shepherd, 1994), breast self-exams (e.g., Meyerowitz & Chaiken, 1987), mammograms (e.g., Banks et al., 1995), Pap tests (e.g., Lauver & Rubin, 1990), colonoscopy screenings (e.g., Canada & Turner, 2007), skin cancer prevention (e.g., Rothman et al., 1993), vaccinations (e.g., Gerend & Shepherd, 2007), and hand hygiene (e.g., Jenner, Jones, Fletcher, Miller, & Scott, 2005).

Many of these studies examined message framing effects on intentions to perform behaviors rather than on actual behavior performance. According to the theory of reasoned action (Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975), intentions to perform (or not perform) a given behavior are the most proximal (immediate) determinant of

behavior. A recent meta-analysis of meta-analyses revealed a strong correlation ($r = .53$) between intention and behavior, indicating that on average, intentions explain 28% of the variance in future behavior (Sheeran, 2002).

A few examples of message framing research in health behaviors are presented next. First, studies are presented that found main effects of message framing in detection, prevention, and mixed-function (detection and prevention) behaviors. Next, studies are presented that found moderating effects on message framing in a variety of health behaviors. Finally, discordant findings in the message framing empirical literature are briefly discussed along with possible explanations.

Detection behaviors. Several studies revealed findings consistent with Rothman and Salovey's (1997) prediction that loss-framed appeals are more effective in promoting illness-detection (screening) behaviors than gain-framed appeals. For example, Meyerowitz and Chaiken (1987) were the first to examine the relative influence of gain- and loss-framed information on health behavior. They hypothesized that a pamphlet emphasizing the negative consequences of not performing breast self-examination (BSE) (loss-framed) would be more persuasive than a pamphlet emphasizing positive consequences of BSE (gain-framed). Seventy-nine undergraduate female college students were randomly assigned to read a gain-framed message, a loss-framed message, a no-arguments message, or no message at all about BSE. Intentions to perform BSE were assessed immediately after the intervention and 4-months later during a phone interview. As predicted, women who read the loss-framed pamphlet reported greater intentions and more frequent BSE behavior 4-months after the intervention than women in the other three conditions.

Loss-framed messages have also been found to be more effective to promote mammography screenings. Banks et al. (1995) compared the effectiveness of gain- versus loss-framed messages to persuade women to obtain mammography screening. They recruited 133 women 40 years and older not adhering to current guidelines for obtaining mammography screening. These women were randomly assigned to view either gain-framed or loss-framed factually equivalent educational video presentations on breast cancer and mammography. Mammography utilization was assessed at 6- and 12-month intervals via phone interviews. As hypothesized, women in the loss-framed condition were more likely to have obtained a mammogram within 12 months of the intervention.

Message framing effects on dental detection behaviors have also been examined. Rothman, Martino, Bedell, Detweiler, and Salovey (1999, Experiment 2) recruited undergraduate college students to test the relative effectiveness of gain- and loss-framed messages to promote use of a disclosing mouth rinse to detect plaque. Immediately after reading the pamphlet on dental health, behavioral intentions were assessed. As predicted, students who read the loss-framed message reported stronger intentions to buy and use the disclosing mouth rinse within the next week than those who read the gain-framed message. Furthermore, a significantly greater percentage of students in the loss-framed condition requested a sample of the product than did those in the gain-framed condition.

Prevention behaviors. Several studies have also revealed findings consistent with Rothman and Salovey's (1997) prediction that gain-framed appeals have a more effective impact on health-affirming (prevention) behaviors than loss-framed appeals. For example, in the same experiment just described, Rothman et al. (1999, Experiment 2) recruited undergraduate college students to also test the relative effectiveness of gain- and

loss-framed messages in promoting use of a mouth rinse to prevent (rather than detect) dental health problems. Immediately after reading the pamphlet on dental health, behavioral intentions were assessed. As predicted, students who read the gain-framed message reported stronger intentions to buy and use the mouth rinse within the next week than those who read the loss-framed message. A significantly greater percentage of students in the gain-framed condition requested a sample of the product than did those in the loss-framed condition.

Gain-framed messages have also been found to be more effective in promoting sunscreen use to prevent skin cancer. Detweiler, Bedell, Salovey, Pronin, and Rothman (1999) compared the effectiveness of four different framed messages to persuade 217 adult beach-goers to obtain and use sunscreen. There were two gain-framed conditions (a gain or a non-loss) and two loss-framed conditions (a loss or a non-gain). Beach-goers were approached while at the beach and were assigned to read one of four brochures about skin cancer and the use of sunscreen. Intentions were assessed before and immediately after the intervention. There was also a behavioral measure, where participants were given a coupon upon completing the questionnaire that was redeemable later that day for a free sunscreen sample. As predicted, people who read either gain-framed brochure reported higher intent to repeatedly apply sunscreen while at the beach and to use sunscreen with a sun protection factor of 15 or higher, and they requested sunscreen more often (i.e., redeemed the coupon) than those who read either loss-framed brochure. The gain-framed advantage was strongest among beach-goers who had not planned to use sunscreen that day prior to the intervention.

Message framing effects on physical activity have also been examined. For example, Latimer, Rench, et al. (2008) recruited 322 sedentary, healthy callers to the U.S. National Cancer Institute's Cancer Information Service to compare the effectiveness of gain-, loss-, and mixed-framed messages on promoting moderate to vigorous physical activity. Participants randomly received one of three framed messages on three separate occasions (via telephone at baseline and via print at Weeks 1 and 5). Intentions and self-reported physical activity were assessed at baseline, Week 2, and Week 9 via phone interview. At Week 2, gain- and mixed-framed messages resulted in stronger intentions to engage in physical activity than loss-framed messages. In addition, as predicted at Week 9, people who read gain-framed messages self-reported greater physical activity participation than those who read loss- or mixed-framed messages.

Van't Riet, Ruiter, Werrij, and De Vries (2010) also found a gain-framed advantage for physical activity. They conducted a web-based study with 787 adults living in the Netherlands, of which 299 completed all measures. Participants were randomly assigned to read either a gain- or loss-framed message about physical activity. Intentions to be physically active were assessed prior and immediately after reading the message. Physical activity levels were also assessed at a 3-month follow-up via email. As predicted, people who read gain-framed messages had stronger intentions and marginally greater levels of physical activity than those who read loss-framed messages.

Mixed-function behaviors. Researchers have also examined message framing effects on health behaviors that may be perceived as having mixed functions (e.g., detection and prevention). For example, Rivers, Salovey, Pizarro, Pizarro, and Schneider (2005) conducted an experiment with 441 women who attended an urban community

health clinic to test the hypothesis that loss- and gain-framed messages differentially influence Pap test utilization behaviors depending on the risk involved in performing the behavior. Participants were randomly assigned to view one of four video presentations about the importance of obtaining an annual Pap test. Self-reported Pap test utilization was assessed at 6 and 12 months via telephone following the intervention. Consistent with Rothman and Salovey's (1987) predictions, when Pap tests were presented as having a detection function, loss-framed messages that emphasized costs of failing to detect cervical cancer early (a risky behavior) were more persuasive in motivating women to obtain a Pap test than were gain-framed messages. However, when Pap tests were presented as having a prevention function, gain-framed messages that emphasized the benefits of preventing cervical cancer (a less risky behavior) were more persuasive than loss-framed messages. Other researchers have found similar results with different mixed-function health behaviors (e.g., Hsiao, 2003; Rothman et al., 1999).

Moderators of message framing. Whereas several early studies tested only main effects of framing on health behaviors, more recent research on message framing has focused on identifying and examining variables that moderate framing effects. In Myers' (2010) review of the literature, she found over 20 variables that have been examined as moderators of message framing effects. Some of these variables are situational such as health behavior type or function (e.g., Hsiao, 2003), framing method (e.g., Ferguson & Gallagher, 2007), temporal context (e.g., Gerend & Cullen, 2008), and type of value appeal (health vs. self-esteem, e.g., Robberson & Rogers, 1988). Other variables are dispositional and represent individual differences such as cognitive processing style (e.g., Meyers-Levy & Maheswaran, 2004), issue involvement (e.g., Rothman et al., 1993),

personal relevance (e.g., McElroy & Seta, 2003), stages of readiness to change (e.g., Hsiao, 2003), need for cognition (e.g., Rothman et al., 1999), perceptions of benefits, risks/threats, susceptibility, and/or disease severity (e.g., Toll et al., 2008), behavioral norms (e.g., Blanton, Stuart, & VandenEijnden, 2001), perceived source credibility (e.g., Arora, Stoner, & Arora, 2006; Jones et al., 2003), motivational orientation (e.g., Gerend & Shepherd, 2007; Mann et al., 2004; Uskul et al., 2009), and consideration of future consequences (e.g., O'Connor et al., 2009). A few studies involving three of these variables - motivational orientation, temporal context, and CFC - are presented next.

Motivational orientation. Motivational orientation has been found to moderate message valence framing effects on health behaviors. For example, in relation to the approach/avoidance system previously described, Mann et al. (2004) developed a congruency hypothesis which predicts that health messages framed to be aligned with people's approach/avoidance motivations will be the most effective in promoting health behaviors. For example, a gain-framed message should be more persuasive with a person who is predominantly approach-oriented, and a loss-framed message should be more persuasive with a person who is predominantly avoidance-oriented. Several studies lend support for this hypothesis.

Carver and White's (1994) BIS/BAS scale (which consists of a BIS scale and a BAS scale) has been used to assess motivational orientation. Mann et al. (2004) tested the congruency hypothesis with 63 undergraduate college students who did not floss regularly. Participants first completed the BIS/BAS scale and were then randomly assigned to read either a gain- or loss-framed article on dental flossing. They were also given samples of floss and were instructed to use them. Self-reported flossing behavior

was measured via written questionnaire one week after the intervention. As predicted, “avoiders” were more persuaded by loss-framed messages, whereas “approachers” were more persuaded by gain-framed messages.

In a follow-up study, Sherman et al. (2006) used a similar procedure with 67 undergraduate students who did not floss regularly, but measures of message perception, self-efficacy, and intentions were added in an effort to examine the psychological pathways through which the interaction of dispositional motivations and message framing leads to health behavior change. As predicted, people who read a congruently framed message intended to floss more and used more dental flosses than those who read an incongruent message. There was also evidence that self-efficacy and intentions mediated the congruency effect.

In another follow-up study, Updegraff, Sherman, Luyster, and Mann (2007) also explored if argument strength moderated the congruency effect. One hundred and thirty-six undergraduate college students who did not regularly floss read either a strong or weak message about dental flossing with a frame (gain vs. loss) that either matched or mismatched their motivational orientation (approach vs. avoidance). Results showed participants were sensitive to argument strength in the matched but not in the mismatched conditions. Argument strength moderated the congruency effect on self-reported flossing behaviors. When arguments were strong, matching the message to motivations yielded favorable effects on flossing behavior; however, when arguments were weak, matching the message to motivations led to noticeably worse effects on these outcomes. These findings suggest strong arguments may be necessary when attempting to optimize the impact of message frame and motivational orientation.

Gerend and Shepherd (2007) tested the congruency hypothesis with 121 female undergraduate college students. Participants were randomly assigned to read a gain- or loss-framed booklet on the promotion of a vaccine against human papillomavirus (HPV). After reading the message, participants completed a post-manipulation survey, including the BIS/BAS scale and a measure of intentions. As predicted, a loss-frame advantage was observed for people high in avoidance motivation. “Avoiders” who read the loss-framed message reported greater HPV vaccination intentions than those who read the gain-framed message. However, a gain-frame advantage was not observed for people high in approach motivation.

Similar to the congruency hypothesis in the approach/avoidance system (Mann et al., 2004), Higgins (2000) proposed the “value from fit” hypothesis in the promotion/prevention system. The “value from fit” hypothesis posits when people pursue goals in a manner consistent with their regulatory focus, they experience a sense of “fit” that increases the value of the health behavior and thereby increases the behavior’s likelihood of occurrence. Several studies support this hypothesis and have found that a message framed to fit people’s regulatory focus is more persuasive. For example, a gain-framed message should be more persuasive with a person who is predominantly promotion-focused, and a loss-framed message should be more persuasive with a person who is predominantly prevention-focused.

Scales such as the regulatory focus scale (Lockwood, Jordan, & Kunda, 2002) and the Regulatory Focus Questionnaire (RFQ) (Higgins et al., 2001) have been used to assess dispositional regulatory focus. Both scales consist of a promotion focus and a prevention focus scale. Latimer, Rivers, et al. (2008) examined the effectiveness of

regulatory fit messages for increasing physical activity among inactive people. Two hundred and six sedentary adult participants recruited from the National Cancer Institute's Cancer Information Service were randomly assigned to receive either promotion (benefits)-focused or prevention (costs)-focused messages encouraging physical activity. Two weeks later, participants completed a follow-up phone interview that assessed regulatory focus (using the RFQ) and amount of physical activity over the previous 7 days. As predicted, tailored messages that fit people's regulatory focus led to greater physical activity participation than non-fit messages, particularly in the promotion-focused condition. In the prevention-focused condition, patterns of behavior were as predicted but were not significantly different.

Uskul et al. (2009) examined the "value from fit" hypothesis with 100 undergraduate students from two cultural groups (White British and East-Asians) likely to differ in their chronic dominant regulatory focus. Participants completed the regulatory focus scale and then read a randomly assigned gain- or loss-framed message about dental flossing. They then answered items related to attitudes towards flossing and intentions to floss over the following week. Attitude and intention scores were highly correlated and were therefore combined to form one index of persuasion. As predicted, the mediated moderation analysis revealed three two-way interactions: message frame x cultural background, regulatory focus x cultural background, and message frame x regulatory focus (the latter which supports the "value from fit" hypothesis). In addition, the message frame x regulatory focus interaction mediated the message frame x cultural background interaction. White British participants (who had an overall stronger promotion focus) assigned to read the gain-framed message were more persuaded to floss than those who

read the loss-framed message, whereas East-Asian participants (who had an overall stronger prevention focus) assigned to read the loss-framed message were more persuaded to floss than those who read the gain-framed message.

Latimer, Williams-Piehot, et al. (2008) recruited 518 adults from the National Cancer Institute's Cancer Information Service, who were randomly assigned to receive either prevention- or promotion-oriented messages encouraging fruit and vegetable intake. Messages were mailed at 1 week, 2 months, and 3 months after a baseline interview. The RFQ was used to assess regulatory focus. Follow-up interviews were conducted via telephone at 1 and 4 months to assess participants' actual fruit and vegetable intake and to determine if they were meeting or failing to meet the "5 A Day" guideline. The pattern of findings was consistent with the "value from fit" hypothesis, but the interactions were only marginally significant. At the 4-month follow-up, "promoters" who read the promotion-oriented message were somewhat more likely to meet the "5 A Day" guideline than "preventers", whereas "preventers" who read the prevention-oriented message were somewhat more likely to meet the guideline than "promoters". No differences in behavior were noted between groups at the 1-month follow-up.

Temporal context. Temporal context is another variable that has been shown to moderate message valence framing effects. Gerend and Cullen (2008) evaluated the interactive effects of valence framing and temporal context on college student alcohol use. Two hundred and twenty-eight participants were randomly assigned to read an alcohol prevention message that varied by message valence frame (gains vs. losses) and temporal context (short- vs. long-term consequences). Alcohol drinking behavior was assessed one month post-intervention. An interaction was found as predicted. Students

who read the gain-framed message reported lower alcohol use as compared to those who read the loss-framed message, but only when consequences were presented as short-term. Valence frame had no effect when consequences were presented as long-term.

TCT predictions suggest that the level of construal (high vs. low) with which valence is associated, rather than valence itself, determines the effect of temporal distance on decision making. In a series of five non-health behavior studies with college students, Trope and Liberman (2000) found that for decisions involving the distant-future, people chose options that had positive high-level construals but negative low-level construals and rejected options that had negative high-level construals but positive low-level construals. The reverse was true for decisions involving the immediate-future.

Consideration of future consequences. CFC is a cognitive mindset that refers to the extent to which people consider distant outcomes of their current behaviors and the extent to which people are influenced by these considerations (Strathman et al., 1994). CFC has been found to moderate message temporal framing effects. Strathman et al. (1994) hypothesized that people low in CFC focus more on their immediate needs and concerns and will therefore act to satisfy these immediate needs. Conversely, people high in CFC consider the future implications of their behavior and act in accordance with their distant goals. Several studies lend support to this hypothesis.

Strathman et al.'s (1994) CFC scale is often used to assess CFC. Orbell, Perugini, and Rakow (2004) were the first to extend Strathman et al.'s (1994) CFC hypothesis in the health domain. They used a 2 (time frame) x 2 (order of positive and negative consequences) x 2 (CFC) design to construct four messages about bowel (colorectal) cancer screening. Each message contained two positive and two negative consequences,

where the order of these consequences was counterbalanced. Two hundred and twenty 50 – 69 year old people from the community read one version of the message and then completed post-manipulation measures, including the CFC scale. As predicted, a CFC main effect and CFC x time frame interaction were obtained. For the main effect, people high in CFC favored screening more than people low in CFC. For the interaction, people low in CFC (compared to those high in CFC) produced more positive thoughts, and they were more likely to endorse colorectal screening when positive consequences were short-term and negative consequences were long-term. People high in CFC (compared to those low in CFC) produced more positive thoughts, and they were more likely to endorse screening when positive consequences were long-term and negative consequences were short-term.

Orbell and Hagger (2006) recruited 210 adults from the community and assigned them to read one version of a message about a proposed type 2 diabetes screening program (developed using the same 2 x 2 x 2 design as Orbell et al., 2004). After reading the message, participants completed post-manipulation measures, including the CFC scale. High CFC individuals held more positive thoughts and showed greater intentions toward diabetes screening than low CFC individuals. There was also an expected CFC x time frame interaction. People low in CFC (compared to those high in CFC) produced more positive thoughts and showed greater intention to partake in diabetes screening when positive consequences were short-term and negative consequences were long-term. The opposite was true for people high in CFC (compared to those low in CFC). Furthermore, the CFC x time frame interaction effect on intentions was mediated by the net number of positive thoughts.

Orbell and Kyriakaki (2008) were the first to examine the CFC hypothesis in a prevention (vs. detection) behavior. They conducted two experiments (both using a similar 2 x 2 x 2 design as the previous two studies described above) with staff, students, and visitors around a university campus ($N = 121$ and $N = 279$) and assigned participants to read a message about skin cancer and sunscreen use. Participants in both experiments completed the CFC scale after reading the message. Experiment one assessed intention to use sunscreen as the outcome measure, whereas experiment two assessed behavior (redemption of a voucher for free sunscreen) as the outcome measure. A main effect was observed in the first experiment, where high CFC individuals showed greater intention to use sunscreen than low CFC individuals. The CFC hypothesis was supported in both experiments. In experiment one, people high in CFC (compared to those low in CFC) reported greater intentions to use sunscreen when positive outcomes were presented as distal and negative outcomes were presented as immediate; the opposite was true for people low in CFC (compared to those high in CFC). In experiment two, people low in CFC (compared to those high in CFC) were more likely to redeem vouchers for free sunscreen when positive outcomes were presented as immediate and negative outcomes were presented as future. Although the opposite pattern was seen for people high in CFC, the interaction was not significant. The CFC x time frame interaction effect on intentions (experiment one) and behavior (experiment two) was mediated by the net number of positive thoughts.

CFC has also been found to moderate message valence and regulatory focus framing effects. O'Connor et al. (2009) found that people high in CFC were more responsive to loss-framed messages related to health information-seeking behaviors, and

people low in CFC were more responsive to gain-framed messages. Kees (2007) found people high in CFC reported greater levels of persuasion than people low in CFC when a message related to consuming unhealthy foods was prevention-framed; however, when the message was promotion-framed, people low and high in CFC responded similarly.

Discordant findings. Despite many studies showing hypothesized effects, the overall pattern of results for message framing's influence on health behavior decisions is inconsistent. For example, although several studies revealed findings consistent with Rothman and Salovey's (1997) predictions for detection and prevention behaviors (as previously presented), several studies failed to find an advantage for either frame (e.g., Lalor & Hailey, 1990; Lauver & Rubin, 1990) or found the message framing effect to be limited to a specific subset of individuals (e.g., Apanovitch et al., 2003; Finney & Iannotti, 2002).

Possible explanations for these and other discordant results have been offered that include the limitations of prospect theory (e.g., Rothman & Salovey, 1997), ambiguous theoretical terms such as "risk" (O'Keefe & Jensen, 2006, 2007), inconsistent applications of prospect theory (e.g., O'Keefe & Jensen, 2006, 2007), the influence of other theories/conceptual models (e.g., Wilson et al., 1988), the lack of a universal operational definition of message framing (e.g., Levin et al., 1998), the variability in taxonomies/classification schemes of message framing (e.g., Levin et al., 1998), the diversity of behaviors studied (e.g., Wilson et al., 1988), the variability in perceptions of health behavior functions (prevention vs. detection, e.g., Rothman et al., 2009), and the existence of omitted moderating variables (e.g., Rothman et al., 1997). A summary of

three meta-analytic reviews on message framing research is presented next that further addresses discrepant findings in the literature.

Meta-analytic Reviews on Message Framing Research

Three meta-analysis papers on message framing research have been published in an attempt to systematically organize, analyze, and summarize the effects of message framing on health and other types of behaviors. The earliest meta-analysis was by Kühberger (1998). He examined 136 empirical papers that reported framing experiments. Based on studies described within these papers, he calculated 230 single effect sizes. His analysis encompassed a broad scope of domains (health, business, gambling, and social), study designs, and framing types. He defined and coded study characteristics in the following areas and examined each as a potential moderating variable: risk characteristics (including risk manipulation, quality of risk, and number of risky events); task characteristics (including framing manipulation, response mode, comparison, unit of analysis, and problem domain); participant characteristics (including whether the sample was students or the target audience); and year of publication. His findings revealed that overall message framing produced small to moderate effects. In addition, he found that taken as a whole, most of the study characteristics were significant moderators except participant characteristics (student vs. non-student population) and unit of analysis (individual vs. group).

More recently, O'Keefe and Jensen (2006) conducted a meta-analytic review of the relative persuasiveness of gain- and loss-framed messages based on 165 studies. They classified the studies into six distinct broad categories: disease detection behaviors, disease prevention behaviors, other health-related behaviors, sociopolitical subjects,

advertising of consumer products and services, and other (otherwise unclassified). They also coded each message as containing one of four types of kernel state phrasing (i.e., linguistic representations of the consequence/outcome): exclusively desirable, exclusively undesirable, combination of desirable and undesirable, or indeterminate (related to unavailability of sufficient message detail). They examined both message topic and kernel state phrasing as potential moderating variables. For each distinguishable message pair, they calculated an effect size to summarize the comparison between a gain-framed message and its loss-framed counterpart. Across all 165 studies, they did not find a significant persuasive advantage for one framing form over the other. However, they did find that message topic had a significant moderating effect. Of the five substantive behavior categories examined, only disease prevention showed a significant difference in persuasiveness. For messages advocating disease prevention behaviors, there was a significant persuasive advantage of gain-framed messages over loss-framed messages (consistent with theoretical predictions). Contrary to expectation, however, for messages advocating disease detection behaviors, gain- and loss-framed messages did not significantly differ. In addition, they did not find any significant moderating effects of kernel state phrasing. O’Keefe and Jensen (2006) offer several possible explanations of their findings. The most plausible explanation is presented next.

As previously discussed, health prevention and detection behaviors are commonly described in terms of their risk, with prevention behaviors typically perceived as less risky than detection behaviors. It is this distinguishing characteristic that has guided several theoretical predictions of message framing effects on these behaviors. O’Keefe and Jensen (2006) suggest that the word “risk” and its variants (e.g., “risky”) are

ambiguous and have various interpretations. In the original prospect theory (Kahneman & Tversky, 1979, 1984; Tversky & Kahneman, 1981), “risk” refers to the association between action and outcome; an action is perceived as “risky” if its outcomes are perceived as probabilistic or not certain. In the more familiar application of prospect theory to gain-loss message variation (e.g., Rothman & Salovey, 1997), “risk” refers to the perceived desirability or dangerousness of an outcome; a behavior is perceived as “risky” if its outcome is undesirable or dangerous. These different interpretations of prospect theory make some theoretical assumptions problematic. For example, some people may perceive exercise (a prevention behavior) as “not risky” because it is typically safe; others may perceive exercise as “risky” because the outcomes are not certain. If people use level of uncertainty to classify a behavior’s level of risk, this may result in no difference of perceived risk between disease detection and disease prevention behaviors and thus no effect of message framing.

In an extension of this meta-analysis, O’Keefe and Jensen (2007) published another review, with a specific focus on only disease prevention behaviors. They analyzed 93 studies that examined gain-framed and loss-framed messages in advocating disease prevention behaviors. Unlike their previous analysis, they classified these prevention behaviors into eight health-related categories: diet/nutrition behaviors, safer-sex behaviors, skin cancer prevention behaviors, dental hygiene behaviors, exercise behaviors, smoking cessation or non-initiation, inoculation (vaccination), and other (or multiple different) prevention behaviors. They also coded each message as containing one of four types of kernel state phrasing. They examined both specific behavior type and kernel state phrasing as design variables potentially moderating framing effects. For each

distinguishable message pair, they calculated an effect size to summarize the comparison between a gain-framed message and its loss-framed counterpart. They found a significant advantage of gain-framed appeals, but the effect size was extremely small and limited to one prevention behavior (dental hygiene). For messages advocating dental hygiene behaviors, the analysis revealed expected results: gain-framed appeals were more persuasive than loss-framed appeals. However, the analysis found no differences in persuasiveness between framed messages concerning any of the other seven prevention behavior categories. For kernel state phrasing, they found message framing effects do not dependably vary as a consequence of kernel state phrasing in gain-framed appeals but that they do dependably vary in loss-framed appeals.

O'Keefe and Jensen (2007) go on to discuss possible explanations for their findings, including unique characteristics of dental hygiene behaviors. The most plausible explanation they offer relates to the varying ambiguous interpretations of "risk", as previously described in their 2006 meta-analysis. They suggest that it cannot be assumed that all health prevention and health detection behaviors are considered risk-averse and risk-seeking, respectively. Consequently, it cannot be predicted that matching gain- and loss-framed messages with prevention and detection behaviors, respectively, will always be more effective. They also suggest the perceived protective outcomes of performing dental hygiene behaviors may be more certain (and thus less risky) than the protective outcomes of performing the other seven prevention behaviors, which would potentially make the dental hygiene behaviors more sensitive to the expected effects of gain-framed messages.

As with any meta-analytic study, each of the three reviews had limitations to consider, such as the exclusion of potentially relevant studies, insufficient message details to examine variables of interest such as “dose” of framing manipulation, the methods for calculating certain effect sizes (as noted in O’Keefe & Jensen, 2007), and insufficient power to detect differences in all conditions (e.g., as noted in O’Keefe & Jensen, 2007, for both exercise and skin cancer prevention behaviors). In addition, unlike Kühberger’s (1998) review, O’Keefe and Jensen (2006, 2007) did not code for relevant study characteristics as potential moderators in either of their reviews. Furthermore, none of the reviews coded for individual differences variables as potential moderators of message framing effects. In light of the complexities surrounding framing effects, meta-analytic reviews that narrowly examine the literature by only comparing main effects have limited utility. Latimer, Salovey, and Rothman (2007) suggest the effectiveness of framed messages hinges on how individuals think and feel about the behavior and not just the function or nature of the behavior per se. Failure to consider the impact of individual differences on message framing effects may suppress true framing effects and underestimate utility of gain- and loss-framed appeals.

In summary, all three meta-analysis papers on message framing research fall short of providing an adequate, comprehensive review. For example, these papers inconsistently report and compare study characteristics such as research design, research setting, sample description, nature of the health problem (hypothetical or real), dependent variables (e.g., attitudes, beliefs, intentions, and behavior changes), moderating variables, and measures used. Inclusion of these and other factors such as underlying theoretical/conceptual frameworks would have provided a richer understanding of the

literature and better equipped researchers to propose meaningful recommendations based on their synthesis.

State of the Message Framing Literature

Conclusions regarding the current state of the message framing literature and suggestions for advancing this literature are presented next. Regardless of whether examining main effects or moderating effects, the overall pattern of results for message framing's influence on health behavior decisions is inconsistent. Although numerous moderators of framing effects have been studied to help explain these discordant findings, a comprehensive analysis and synthesis of these effects has not been published. More systematic reviews are needed to thoroughly summarize these relationships in order to produce a fuller understanding of message framing's boundaries. In addition, other types of message tailoring (such as temporal proximity framing) need to be examined simultaneously with valence framing to test for interactions that may yield even more persuasive health promotion messages than either manipulation alone. Studies such as these have only recently begun to evolve in the literature.

Message framing as a health communication strategy is underutilized by nurses and is severely lacking in nursing research. Most studies reviewed were from the psychology literature with only a few from the nursing literature (e.g., Jenner et al., 2005; Lauver & Rubin, 1990). In addition, several studies involved hypothetical health-related situations (e.g., Rothman et al., Experiment 1, 1999) rather than actual health problems (e.g., Finney & Iannotti, 2002). Many studies also involved college students (often undergraduate psychology students) (e.g., Sherman et al., 2006) rather than representative

samples of persons with or at risk for developing various diseases such as skin cancer (e.g., Detweiler et al., 1999).

Finally, although message framing studies have been conducted on a breadth of detection and prevention behaviors, fewer studies have examined prevention (Rothman et al., 2008). This is of concern given that modifiable prevention behaviors such as physical inactivity are largely responsible for the high prevalence and incidence of chronic diseases like type 2 DM (WHO, 2005b). Although a few studies that examined physical activity yielded some main effects of message framing consistent with Rothman and Salovey's (1997) predictions (e.g., Latimer, Rench, et al., 2008; Van't Riet et al., 2010), several did not (e.g., Arora et al., 2006; Jones et al., 2004; McGall & Ginis, 2004). More importantly, the majority of these studies revealed one or more variables that moderated message framing effects on physical activity such as source credibility (e.g., Arora et al., 2006; Jones et al., 2003; Jones et al., 2004), type of value appeal (e.g., Robberson & Rogers, 1988), stages of readiness to change (e.g., Hsiao, 2003), need for cognition (e.g., Hsiao, 2003), and gender (e.g., Hsiao, 2003; Kroll, 2005). However, two variables of interest that have not been widely tested as moderators of framing effects on physical activity behaviors are CFC and motivational orientation. These and other potential moderators should be examined in physical activity and other prevention behaviors with salient populations (e.g., people with type 2 DM) to advance the message framing literature and to better guide health care providers in developing and delivering effectively tailored health messages to promote healthy behaviors.

Chapter Summary

A comprehensive review of the message framing literature revealed numerous gaps in which future research is needed to help fill. The present study draws from prospect theory, TCT, and motivation theories to address several of these gaps and to advance both the message framing and nursing literature. The next chapter describes the method used to conduct the present study.

Chapter 3:

Method

This chapter describes the method used to explore how two individual differences factors – CFC and motivational orientation – may combine to moderate temporal proximity and valence framing effects on intentions to increase physical activity. The research design, participants, and study materials are first described, followed by a discussion of research procedures.

Research Design

The present study was an experimental design using random assignment. Valence (gains vs. losses) was crossed with temporal proximity (immediate vs. distal) to form four versions (frames) of the health message. Two individual differences constructs (CFC and motivational orientation) were measured using established instruments, each hypothesized to moderate the influence of the framing manipulation on intentions to increase physical activity.

Data collection consisted of a mail survey that was conducted using Dillman's Tailored Design Method (TDM) (Dillman, Smyth, & Christian, 2009). This method is based on social exchange theory and over 30 years of empirical research aimed at maximizing survey response rates. The method entails up to five different contacts: 1) an initial prenotice letter to respondents describing the importance of the forthcoming survey

booklet; 2) the booklet itself which arrives a few days later with a personalized cover letter, token incentive (\$1 - \$5 is typically recommended), and stamped return envelope; 3) a reminder/thank you postcard sent to all recipients a few days to a week following the booklet; 4) a replacement booklet and different cover letter, with a slightly more insistent tone, sent to those who have still not responded by 2 - 4 weeks; and 5) a final contact made by a different mode of delivery 2 – 4 weeks after the previous mailing (e.g., special mail delivery, telephone follow-up call). The first four contacts were used in the present study; no telephone calls were made. Although the TDM approach is more expensive and labor intensive than a “one-shot” bulk mailing approach that typically yields only 25-35% response rate, Dillman’s method routinely produces response rates over 50%. (See Dillman et al., 2009, for examples of empirical studies that used this method).

Participants

Eligible participants were recruited through the University of South Florida (USF) Medical Clinic database. In collaboration with Anthony Morrison, MD and Nancy Grove, ARNP (who specialize in diabetes management), a list was extracted from this database and provided to the principal investigator, which included names and mailing addresses of adult patients (18 years and older) with type 2 DM (based on an ICD-9 code of 250.00 or 250.02) who were seen at the USF Medical Clinic by Dr. Morrison or Ms. Grove between January 1 and December 22, 2009. No protected health information was sought or obtained. The original list of patients contained 695 names. Duplicate names were removed from the list, resulting in 649 unique names.

A power analysis was conducted in order to determine minimum sample size for the present study. Sherman et al. (2006) reported an interaction of motivational

orientation with (valence) framing on promotion of flossing. These estimates of congruence effects (R^2) ranged from .07 to .13. Assuming $\alpha = .05$ and an R^2 of .07 for each main effect in the present study (valence congruence and temporal proximity congruence), it was determined a total of $N = 187$ would provide power $\geq .80$ for testing all three hypotheses using multiple regression.

Materials

Health message development. Four versions of a health message aimed to increase physical activity of people with diabetes were constructed based on published diabetes materials from organizations such as the ADA, NIDDK, and the American Association of Diabetes Educators (AADE). Key principles from the National Cancer Institute (NCI, 1994) were also used as a guide when designing the message content and layout. The first paragraph in the body of text was identical across all four versions and contained information such as examples of physical activities and recommendations for how often to engage in these activities. The second paragraph contained the same factual content but differed among the four versions only in valence and temporal proximity frames as follows: gain-framed/distal, gain-framed/immediate, loss-framed/distal, and loss-framed/immediate. (Refer to Table 1 for details of the framing manipulation). The two gain-framed conditions listed eight statements regarding the benefits people may gain by doing regular physical activity, whereas the two loss-framed conditions listed these same eight statements but framed as benefits people may lose by not being physically active. The two distal-framed conditions presented these gains or losses as outcomes that may occur in the future, whereas the two immediate-framed conditions presented them as outcomes that may occur immediately.

Table 1

Details from Four Health Message Versions to Illustrate Temporal Proximity and Valence Framing Manipulation

Temporal	Valence	
	Gain	Loss
Distal	<p>By doing regular physical activity, you may gain these benefits in the years to come:</p> <ul style="list-style-type: none"> - Brighter mood and more positive attitude - Greater self-esteem, pride, and confidence - More energy, better sleep, better sex life, and less stress - Increased burning of extra calories to help keep a healthy weight - Improved blood pressure, blood cholesterol, and circulation - Less need for diabetes medication due to better blood sugars - Stronger bones, more strength, and increased flexibility and balance - Reduced arthritis pain 	<p>By not doing regular physical activity, you may lose benefits in the years to come by:</p> <ul style="list-style-type: none"> - Missing out on a brighter mood and more positive attitude - Missing out on greater self-esteem, pride, and confidence - Missing out on more energy, better sleep, better sex life, and less stress - Missing out on increased burning of extra calories to help keep a healthy weight - Missing out on improved blood pressure, blood cholesterol, and circulation - Missing out on less need for diabetes medication due to better blood sugars - Missing out on stronger bones, more strength, and increased flexibility and balance - Missing out on reduced arthritis pain
Immediate	<p>By doing regular physical activity, you may gain these benefits immediately (within 1-2 weeks):</p> <ul style="list-style-type: none"> - Brighter mood and more positive attitude - Greater self-esteem, pride, and confidence - More energy, better sleep, better sex life, and less stress - Increased burning of extra calories to help keep a healthy weight - Improved blood pressure, blood cholesterol, and circulation - Less need for diabetes medication due to better blood sugars - Stronger bones, more strength, and increased flexibility and balance - Reduced arthritis pain 	<p>By not doing regular physical activity, you may lose benefits immediately (within 1-2 weeks) by:</p> <ul style="list-style-type: none"> - Missing out on a brighter mood and more positive attitude - Missing out on greater self-esteem, pride, and confidence - Missing out on more energy, better sleep, better sex life, and less stress - Missing out on increased burning of extra calories to help keep a healthy weight - Missing out on improved blood pressure, blood cholesterol, and circulation - Missing out on less need for diabetes medication due to better blood sugars - Missing out on stronger bones, more strength, and increased flexibility and balance - Missing out on reduced arthritis pain

According to the NCI (1994), use of headers, footers, and graphics on print materials can enhance readability and effectiveness of the message. Three concise statements (boldfaced, underlined, and/or italicized) were positioned above and below the body of text to not only reiterate the message's main emphasis but to also strengthen the framing manipulation. Among the four message versions, these statements differed only in temporal proximity and valence frames (e.g., "Physical Activity Can Improve Your Health Immediately" vs. "Lack of Physical Activity Can Jeopardize Your Health in the Years to Come"). Furthermore, simple graphics were used that were culturally sensitive and relevant to the text, illustrating five examples of physical activities (i.e., weight lifting, walking, biking, golfing, and gardening). These graphics were identical across all four versions. (See Appendices A – D for the four health message versions).

Health message pilot study. The four versions of the health message were pilot-tested with 20 nurse practitioners (NPs) familiar with the diabetes population ($n = 5$ per version using random assignment). The purpose of this pilot was to obtain feedback regarding the proposed framing manipulation and format in order to determine the need for revisions, if any, prior to conducting the present study. After reading the message, each NP completed a 6-item questionnaire. (See Appendix E). One item assessed perceived believability of the message. Two items assessed the temporal proximity framing manipulation, where NPs rated the extent to which the message emphasized physical activity outcomes that can happen in the future versus immediately. Two more items assessed the valence framing manipulation, where NPs rated the extent to which the message emphasized benefits of being physically active versus risks of being physically inactive. Responses to the five items (listed in Table 2) were provided on a 7-point scale

ranging from -3 (strongly disagree) to +3 (strongly agree), with the midpoint labeled “neither agree nor disagree”. The sixth item was an open-ended question asking NPs their thoughts about the graphics included on the message.

Table 2

Summary of Pilot Study Data for Evaluation of Health Message Believability and Framing Manipulation of Temporal Proximity and Valence

Questionnaire Item	Condition ($n = 5$ each)			
	GD	GI	LD	LI
1. The message was very believable.	2.60	1.20	2.20	2.40
2. The message emphasized things that can happen in the future.	1.80	1.40	2.80	1.60
3. The message emphasized things that can happen immediately.	2.20	1.20	1.60	2.40
4. The message emphasized the benefits of being physically active.	2.80	3.00	2.60	2.00
5. The message emphasized the risks of not being physically active.	0.40	-0.60	2.60	1.60

Note. $N = 20$. Each of the five items was rated on a 7-point scale ranging from -3 (strongly disagree) to +3 (strongly agree). Cell means are presented for each condition. GD = gain-framed/distal; GI = gain-framed/immediate; LD = loss-framed/distal; LI = loss-framed/immediate.

Results of the pilot are shown in Table 2. Overall, the pilot group perceived the message as believable ($M = 2.10$, $SD = 1.12$). Marginal means were examined in order to assess framing manipulation. The pattern of means was as expected for three of the four items: item 2 [(distal $M = 2.3$) > (immediate $M = 1.5$)], item 4 [(gain $M = 2.9$) > (loss $M = 2.3$)], and item 5 [(loss $M = 2.1$) > (gain $M = -0.1$)]. For item 3, the marginal means were

nearly identical, but the pattern was not as expected [(distal $M = 1.9$) > (immediate $M = 1.8$)]. Finally, overall invited comments were positive, and the graphics were reported to be appropriate and not distracting. In summary, pilot results suggested the health messages were perceived as intended and graphics were appropriate; therefore, no changes were made to the original health message versions prior to conducting the present study.

Consideration of future consequences. Strathman et al.'s (1994) 12-item CFC scale was used to measure participants' CFC. Strathman et al. (1994) reported reliability across four independent college samples: $\alpha = .80, .82, .86,$ and $.81,$ respectively. Participants in the present study provided ratings for the items on a 5-point scale ranging from 1 (extremely uncharacteristic) to 5 (extremely characteristic), with the midpoint labeled "uncertain". Items 3, 4, 5, 9, 10, 11, and 12 were reverse scored. Responses to the 12 items were averaged into a single index of CFC such that higher scores indicated a greater focus on distal outcomes. Reliability in the current study was $\alpha = .83.$ (See Appendix F for the full CFC scale).

Motivational orientation. Motivational orientation was operationalized using two measures: Carver and White's (1994) BIS/BAS scale and Higgins et al.'s (2001) RFQ scale.

BIS/BAS. The 20-item BIS/BAS scale consists of the 7-item BIS scale (see Appendix G, items 1 – 7) and the 13-item BAS scale (see Appendix G, items 8 – 20), with reported reliabilities of $\alpha = .80$ and $\alpha = .84,$ respectively (Sherman et al., 2006). Participants in the present study provided responses to the items on a 4-point scale ranging from 1 (strongly agree) to 4 (strongly disagree), with items 5 and 7 reverse

scored. Consistent with other studies (e.g., Mann et al., 2004), scores on the two scales were combined into a single index of motivational orientation by subtracting the BAS mean from the BIS mean. A positive score indicated a person was predominantly approach-oriented, whereas a negative score indicated a person was predominantly avoidance-oriented. In the present study, the reliabilities of the BIS and BAS scales were $\alpha = .79$ and $.87$, respectively.

RFQ. The 11-item RFQ scale consists of the 6-item promotion scale (see Appendix H, items 1, 3, 7, 9, 10, and 11) and the 5-item prevention scale (see Appendix H, items 2, 4, 5, 6, and 8), with reported reliabilities of $\alpha = .73$ and $.80$, respectively (Higgins et al., 2001). Participants in the present study provided responses to the items on a 5-point scale ranging from 1 (never or seldom) to 5 (very often), with the midpoint labeled “sometimes”. Items 1, 2, 4, 6, 8, 9, and 11 were reverse scored. Consistent with other studies (e.g., Higgins et al., 2001), scores on the two scales were combined into a single index of motivational orientation by subtracting the prevention mean from the promotion mean. A positive score indicated a person was predominantly promotion-focused, whereas a negative score indicated a person was predominantly prevention-focused. In the present study, the reliabilities of the promotion and prevention scales were $\alpha = .69$ and $.80$, respectively.

Intentions. Eight items were developed to assess participants’ intentions to increase physical activity. Using a 7-point scale ranging from -3 (strongly disagree) to +3 (strongly agree), with the midpoint labeled “neither agree nor disagree”, participants indicated how likely they were to increase physical activity over the next 4 weeks after reading one of the four health message versions. (See Appendix I, items 1 - 8). Responses

to the eight items were averaged into a single index of intentions, with items 1, 4, 6, and 8 reverse-scored ($\alpha = .94$).

Evaluation of the health message.

Believability. The item used in the pilot study was used in the present study to assess perceived believability of the message. Participants provided a response to this item on a 7-point scale ranging from -3 (strongly disagree) to +3 (strongly agree), with the midpoint labeled “neither agree nor disagree”. (See Appendix I, item 9).

Manipulation check. The four items used in the pilot study were used in the present study as a manipulation check to assess the extent to which the four health message versions were perceived as intended. Participants provided responses to the items on a 7-point scale ranging from -3 (strongly disagree) to +3 (strongly agree), with the midpoint labeled “neither agree nor disagree”. (See Appendix I, items 10 – 13).

Demographic and other variables. Several items were developed for participants to self-report age, gender, race/ethnicity, years diagnosed with diabetes, current physical activity, height, and weight. (See Appendix J).

Booklet assembly. Measures were compiled into a booklet in the following order: 1) demographics and other variables; 2) one version of the health message (chosen at random); 3) intentions and evaluation of the health message (combined on the same page); and 4) the individual differences scales (CFC, BIS/BAS, and RFQ, respectively).

Procedures

Institutional Review Board. The present study was reviewed and approved by the USF Institutional Review Board before any pilot or actual data were collected.

Recruitment. Based on results of empirical studies that used Dillman's TDM (Dillman et al., 2009) to conduct mail surveys, a 53% return rate was estimated for the present study. In order to obtain the minimum sample size of 187 (as calculated by the power analysis), it was determined the first sample would consist of 352 eligible participants. A second sample would be selected if mail survey results from the first sample did not yield at least 187 completed booklets. The original list of 649 unique patient names obtained from the USF Medical Clinic database was not sorted in any known order. However, the list was split into two subsets (odd vs. even) to help ensure homogeneity, should a second sample be needed. The initial prenotice letter (see Appendix K) was mailed to all 325 patients from the first subset and the first 27 patients listed in the second subset. About one week later, the second mailing was sent, including a personal cover letter (see Appendix L), the booklet of measures, a \$1 token incentive, and a stamped return envelope. Participants were advised study involvement was voluntary and anonymous and to not put any personal identifiers on the booklet. Within approximately another week, a reminder/thank you postcard was mailed out (see Appendix M). Finally, about 1 month after mailing the first booklet, a replacement booklet with different cover letter (see Appendix N) and a stamped return envelope was sent to eligible participants who had not yet responded.

Chapter Summary

This chapter described the method used in the present study, including research design, participants, study materials, and research procedures. The next chapter describes results of the study, including preliminary analyses, hypotheses testing, and supplemental analyses and findings.

Chapter 4:

Results

This chapter describes results of the present study. Preliminary analyses are presented first, including mail survey results, identification of missing data, description of the final sample, and respondents' perceptions of the health message. Results of hypotheses testing are presented next, followed by supplemental analyses and findings. Unless otherwise noted, significance for all analyses was set at the .05 level (2-tailed).

Preliminary Analyses

Mail survey results. Table 3 shows the mail survey results for each of the four steps in Dillman's TDM (Dillman et al., 2009). Survey response rates were calculated based on the total number of deliverable booklets. The first sample initially yielded a response rate of 48% upon completion of step two, with 163 participants who returned booklets with responses. The subsequent mailing of postcards and replacement booklets (steps three and four) resulted in an additional 28 participants who returned booklets with responses, increasing the response rate to 56% for the first sample. However, at least 20 of these booklets had a substantial amount of missing data; therefore, a second sample was selected by choosing the next 100 eligible participants on the second subset from the USF Medical Clinic list. The four-step mail survey procedure was repeated with the second sample of 100 as with the first sample. The second sample initially yielded a

response rate of 40% upon completion of step two, with 40 participants who returned booklets with responses. The subsequent mailing of postcards and replacement booklets resulted in an additional 8 participants who returned booklets with responses, increasing the response rate to 49% for the second sample. Across both samples, the overall response rate for the mail survey was 54%, with 239 participants who returned booklets with responses.

Table 3

Mail Survey Results Using Dillman's Tailored Design Method

Dillman's TDM Steps	No. Sent	No. Not Returned	No. Returned		
			Not Deliverable	Blank/ Declined	With Responses
First Sample					
1. Prenotice letter	352				
2. Booklet	352	159	9	21	163
3. Postcard ^a	341				
4. Replacement Booklet	159	117	0	14	28
Total	352 ^b	117 ^c	9	35	191
Second Sample					
1. Prenotice letter	100				
2. Booklet	100	51	1	8	40
3. Postcard ^a	98				
4. Replacement Booklet	51	38	1	4	8
Total	100 ^b	38 ^c	2	12	48
Grand Total	452	155	11	47	239

Note. TDM = Tailored Design Method. ^aPostcards were not sent if previous mailings were not deliverable or person had already declined participation. ^bTotal number sent refers to the total number of booklets initially mailed out in each sample. ^cTotal number not returned refers to the replacement booklets only, not the initial booklets.

Missing data. The 239 returned booklets with responses were screened for missing data. Participants needed to have valid responses for at least 80% of the items on all of the scales (intentions, CFC scale, the two BIS/BAS scales, and the two RFQ scales). If participants did not meet this criterion, they were excluded from analyses. This criterion yielded a final sample size of 218 upon which hypotheses were tested. (Participants were not excluded if they had missing data on only demographic or message evaluation variables; therefore, some preliminary and supplemental analyses have an $N < 218$). Several of the excluded participants did not complete any demographic items; therefore, a comparison could not be made between this group and the final sample.

Description of sample. Characteristics of the final sample of 218 participants are summarized in Table 4. Participants ranged from 24 – 92 years old ($M = 58.63$, $SD = 11.96$). Gender was fairly equal, with 104 males and 114 females. The majority (70%) was White/Caucasian, 12% were Hispanic/Chicano/Latino, and 11% were Black/African American. Participants reported having diabetes an average of 14.19 years. Total weekly physical activity ranged from 0 to 1400 minutes ($M = 175.04$, $SD = 227.40$). However, the frequency most commonly reported was 0 minutes (38, or 17%), with a median of 120 minutes. This wide variation may partially be attributed to differences in perception as to what constitutes physical activity. For example, some people may think simply being on their feet is physical activity, regardless of movement. Others may think physical activity involves actions that elevate the heart rate above baseline. Still others may think only planned, structured exercise constitutes physical activity. Finally, participants on average were obese ($M = 33.73$, $SD = 7.88$), which is defined as a body mass index (BMI) of 30 or above (CDC, 2009b). With the exception of age, there were

no significant differences in demographic variables among the four conditions.

Participants who read the immediate-framed information were significantly older than those who read the future-framed information, $F(1, 216) = 4.70, p = .031$.

Table 4

Characteristics of the Final Sample

Characteristics	<i>n</i> (%)	Range	Mean (<i>SD</i>)
Age (years)		24–92	58.63 (11.96)
Gender			
Male	104 (48)		
Female	114 (52)		
Race/Ethnicity			
White/Caucasian	153 (70)		
Black/African American	23 (11)		
Hispanic/Chicano/Latino	25 (12)		
Asian or Pacific Islander/Asian American	10 (5)		
American Indian or Alaskan Native	3 (1)		
Other	2 (1)		
Years with Diabetes		0–50	14.19 (9.25)
Total Weekly Activity (minutes) ^a		0–1400	175.04 (227.40)
Body Mass Index (BMI) ^b		18.7–59.6	33.73 (7.88)

Note. $N = 218$ for all characteristics except race ($N = 216$), years with diabetes ($N = 216$), and total weekly exercise ($N = 213$), related to missing data. ^a Total weekly physical activity was calculated by multiplying number of usual days of physical activity per week by number of usual minutes of physical activity on each of these days. ^b BMI was calculated as follows: (weight in pounds x 703) / (total height in inches)².

Evaluation of the health message. Results of the health message evaluation are shown in Table 5. An ANOVA revealed the four conditions did not produce significant differences on ratings of message believability (item 1). Overall, participants perceived the message as believable ($M = 2.44, SD = 0.82$, scale range -3 to +3). Marginal means

were examined in order to assess framing manipulations. The pattern of means was as expected for all four items: item 2 (distal $M = 2.36$) > (immediate $M = 2.15$); item 3 (immediate $M = 1.99$) > (distal $M = 1.48$), $F(1, 214) = 6.06$, $p = .015$; item 4 (gain $M = 2.63$) > (loss $M = 2.61$); and item 5 (loss $M = 2.29$) > (gain $M = 1.26$), $F(1, 214) = 17.78$, $p < .001$. Participants who read the immediate-framed information rated the message to be more immediate-oriented than those who read the future-framed information. Participants who read the loss-framed information rated the message to have an emphasis on risks more so than those who read the gain-framed information. In summary, results of these checks suggest the health messages were perceived as intended.

Table 5

Summary of Mail Survey Data for Evaluation of Health Message Believability and Framing Manipulation of Temporal Proximity and Valence

Questionnaire Item	Condition			
	GD (<i>n</i> = 59)	GI (<i>n</i> = 52)	LD (<i>n</i> = 55)	LI (<i>n</i> = 50)
1. The message was very believable.	2.51	2.48	2.46	2.32
2. The message emphasized things that can happen in the future.	2.22	2.25	2.51	2.05
3. The message emphasized things that can happen immediately.	1.22	2.00	1.76	1.98
4. The message emphasized the benefits of being physically active.	2.54	2.73	2.69	2.52
5. The message emphasized the risks of not being physically active.	1.24	1.29	2.47	2.08

Note. *N* = 216. Each of the five items was rated on a 7-point scale ranging from -3 (strongly disagree) to +3 (strongly agree). Cell means are presented for each condition. GD = gain-framed/distal; GI = gain-framed/immediate; LD = loss-framed/distal; LI = loss-framed/immediate.

Hypotheses Testing

Calculation of congruence scores. Framing manipulation and individual differences measures were used to construct variables representing temporal proximity congruence and valence congruence. To illustrate, conditional transformation on the CFC score produced the temporal proximity congruence score. For participants in the distal-framed condition, their CFC score represented the degree of temporal proximity congruence with the message (i.e., higher CFC score meant greater congruence), but for participants in the immediate-framed condition, their CFC score represented the degree of

temporal proximity incongruence and was therefore reverse-scored. Similar conditional transformations were performed for both motivational orientation scores (i.e., BIS/BAS and RFQ) to produce two separate valence congruence scores. For participants in the gain-framed condition, both their RFQ and BIS/BAS scores represented the degree of valence congruence with the message (i.e., higher RFQ or BIS/BAS scores meant greater congruence). For participants in the loss-framed condition, both their RFQ and BIS/BAS scores represented the degree of valence incongruence and were therefore reverse-scored. In all three transformations, a constant was added to transformed congruence scores to produce a range of positive values comparable to untransformed scores.

Descriptive statistics. Table 6 provides descriptive statistics for key variables. ANOVAs were conducted to test for differences across the four conditions on each variable.

Table 6

Pearson Correlations and Descriptive Statistics for Key Variables

Variable	1	2	3	4	5	6	7
1. Intentions	-						
2. CFC	.169*	-					
3. BIS/BAS	.014	.147*	-				
4. RFQ	.069	.090	.441*	-			
5. Temporal proximity congruence (CFC)	-.013	.026	.048	.016	-		
6. Valence congruence (BIS/BAS)	-.033	.071	-.071	-.048	.078	-	
7. Valence congruence (RFQ)	-.127	-.022	-.059	.028	.074	.450*	-
<i>M</i>	1.24	3.43	0.10	0.06	3.02	3.93	5.02
<i>SD</i>	1.42	0.71	0.65	0.99	0.83	0.66	0.99
Scale range	-3 to 3	1 to 5	-3 to 3	-4 to 4	1 to 5	1 to 7	1 to 9

Note. Listwise $N=218$. For intentions, higher score represents greater intention to increase physical activity within 4 weeks after reading the health message. For the CFC scale, higher score represents more future-oriented. For the BIS/BAS scale, higher score represents more approach-oriented. For the RFQ scale, higher score represents more promotion-focused. For temporal congruence, higher score represents greater congruence of message with CFC score. For valence congruence, higher score represents greater congruence of message with BIS/BAS or RFQ score. CFC = Consideration of Future Consequences score; BIS/BAS = Behavioral Inhibition System/Behavioral Activation System score; RFQ = Regulatory Focus Questionnaire score.

* $p < .05$.

Scale scores. The four conditions did not differ on the three individual differences scale scores (CFC, BIS/BAS, or RFQ). On average, participants were somewhat future-oriented as evidenced by a mean score above the range mid-point on the CFC scale ($M = 3.43$, $SD = 0.71$, scale range 1 to 5). For motivational orientation, participants as a whole were approach-oriented and promotion-focused as evidenced by positive mean scores on the BIS/BAS ($M = 0.10$, $SD = 0.65$) and RFQ ($M = 0.06$, $SD = 0.99$), respectively. Furthermore, BIS/BAS and RFQ scores were positively correlated ($r = .441$, $p < .001$). As theory would suggest (Higgins, 1997), the more approach-oriented participants tended to be more promotion-focused, and the more avoidance-oriented participants tended to be more prevention-focused. CFC scores were also positively correlated with BIS/BAS scores ($r = .147$, $p = .031$) but not with RFQ scores ($r = .090$, $p = .188$). The more future-oriented participants tended to be more approach-oriented. Furthermore, CFC score had a significant positive correlation with intentions ($r = .169$, $p = .012$). The more future-oriented participants tended to have greater intentions to increase physical activity.

Congruence scores. The four conditions did not differ on the degree of valence congruence (RFQ) with the health message. However, F -tests revealed significant differences in marginal means for temporal proximity congruence and valence congruence (BIS/BAS). Participants in the distal-framed condition had a greater degree of temporal proximity congruence with health message ($M = 3.43$) than participants in the immediate-framed condition ($M = 2.57$), $F(1, 216) = 79.25$, $p < .001$. Participants in the gain-framed condition had a greater degree of valence congruence (BIS/BAS) with health

message ($M = 4.02$) than participants in the loss-framed condition ($M = 3.82$), $F(1, 216) = 5.17$, $p = .024$. As expected, the two valence congruence scores had a significant positive correlation ($r = .450$, $p < .001$).

Intentions. The four conditions did not differ on the intentions index score, as shown in Table 7. Overall, participants in each condition intended to increase physical activity over the next 4 weeks after reading the health message as evidenced by a positive mean score ($M = 1.24$, $SD = 1.42$).

Table 7

Means and (Standard Deviations) for Intentions to Increase Physical Activity as a Function of Framing Manipulation Conditions

Temporal	Valence		Marginal Means
	Gain	Loss	
Distal	1.03 (1.35) $n = 59$	1.24 (1.52) $n = 55$	1.13
Immediate	1.40 (1.44) $n = 53$	1.30 (1.39) $n = 51$	1.35
Marginal Means	1.20	1.27	

Note. $N = 218$. The scale score for intentions to increase physical activity over the next 4 weeks after reading the health message was based on a 7-point scale ranging from -3 to +3.

Hypotheses. Correlations and multiple regression were used to test the three hypotheses:

- H1. When valence of the message is congruent with individuals' motivational orientation (i.e., gain-framed :: approach-oriented/promotion-focused, and loss-framed :: avoidance-oriented/prevention-focused) intentions to increase physical

activity will be greater than when the message is incongruent with individuals' motivational orientation.

- H2. When temporal proximity of the message is congruent with individuals' status on CFC (i.e., immediate-framed :: low CFC, and distal-framed :: high CFC) intentions to increase physical activity will be greater than when the message is incongruent with individuals' CFC.
- H3. When *both* valence and temporal proximity of the message are congruent with individuals' motivational orientation *and* CFC standing, intentions to increase physical activity will be at their highest.

The zero-order correlation of intentions to increase physical activity with valence congruence and temporal proximity congruence was examined to test hypotheses one and two, respectively. Support for these two hypotheses was based on tests of significance of the correlations. Hypothesis three was tested using two regression models with two predictors (the valence and temporal proximity congruence variables) due to the correlation between the two valence congruence measures ($r = .450$). Support for hypothesis three was based on tests of significance applied to the regression coefficients.

Table 8

Summary of Multiple Regression Analyses Predicting Intentions to Increase Physical Activity from Valence Congruence and Temporal Congruence

Variable	B	SE	β
Intercept	1.558	0.665	
Valence congruence (BIS/BAS)	-0.069	0.148	-.032
Temporal congruence (CFC)	-0.017	0.117	-.010
			$R^2 = .001$
Intercept	2.162	0.588	
Valence congruence (RFQ)	-0.181	0.097	-.126
Temporal congruence (CFC)	-0.006	0.116	-.003
			$R^2 = .016$

Note. $N=218$. BIS/BAS = Behavioral Inhibition System/Behavioral Activation System score; CFC = Consideration of Future Consequences score; RFQ = Regulatory Focus Questionnaire score.

* $p < .05$.

Neither hypothesis one nor two was supported as evidenced by non-significant zero-order correlations of intentions to increase physical activity with valence congruence (BIS/BAS) ($r = -.033$, $p = .632$), valence congruence (RFQ) ($r = -.127$, $p = .062$), and temporal proximity congruence ($r = -.013$, $p = .854$). As shown in Table 8, hypothesis three was also not supported. In the first regression equation, main effects were not significant for valence congruence (BIS/BAS) ($\beta = -.032$, $p = .642$) or temporal proximity congruence ($\beta = -.010$, $p = .883$), and the overall model was not significant, $R^2 = .001$, $F(2, 215) = .125$, $p = .882$. Similarly, in the second equation, main effects were not significant for valence congruence (RFQ) ($\beta = -.126$, $p = .064$) or temporal proximity congruence ($\beta = -.003$, $p = .962$), and the overall model was not significant, $R^2 = .016$, $F(2, 215) = 1.753$, $p = .176$.

Supplemental Analyses

Despite the disappointing results of the hypotheses testing, several interesting correlations among other individual differences variables emerged from the present study, as shown in Table 9.

Table 9

Pearson Correlations for Supplemental Analysis Individual Differences Variables

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Intentions	-													
2. Age	-.089	-												
3. Years	-.123	.236*	-											
4. BMI	-.039	-.217*	-.073	-										
5. Activity	-.111	.064	.025	-.216*	-									
6. BIS	-.151*	.260*	.104	-.198*	.145	-								
7. BAS	-.213*	.076	.066	-.118	.095	.203*	-							
8. Promotion	.155*	.066	-.082	-.206*	.157*	.359*	-.189*	-						
9. Prevention	.021	.023	.074	-.044	-.002	.030	.266*	.129	-					
10. Believe	.229*	.137*	.000	.054	-.003	.036	-.024	.178*	.109	-				
11. Future	.019	.003	.021	.111	-.046	.045	.032	.056	.098	.484*	-			
12. Immediate	.101	-.027	-.070	.137*	.073	-.041	-.110	.059	-.045	.379*	.201*	-		
13. Benefits	.138*	.139*	.054	.014	.000	.005	-.103	.204*	.082	.669*	.375*	.309*	-	
14. Risks	-.019	.124	.030	.051	-.001	.004	.030	.026	.019	.293*	.348*	.258*	.258*	-

Note. Listwise $N = 209$. Intentions = intentions to increase physical activity; Years = years with diabetes; BMI = Body Mass Index; Activity = baseline physical activity; BIS = Behavioral Inhibition System scale score; BAS = Behavioral Activation System scale score; Promotion and Prevention = scale scores from the Regulatory Focus Questionnaire; Believe = perceived message believability; Future = perceived message emphasis on future; Immediate = perceived message emphasis on immediate; Benefits = perceived message emphasis on benefits; Risks = perceived message emphasis on risks.

* $p < .05$.

Contrary to Carver and White's (1994) predicted independence between the BIS and BAS scales, the present study revealed a significant positive correlation between these two scales ($r = .203, p = .003$). People with a stronger avoidance-orientation (i.e., lower BIS score) tended to also have a stronger approach-orientation (i.e., lower BAS score). For the RFQ, findings were somewhat consistent with Higgins et al.'s (2001) predicted independence between the promotion and prevention scales, with a positive but only marginally significant correlation ($r = .129, p = .063$). People with a stronger promotion-focus (i.e., higher promotion score) tended to have a somewhat stronger prevention-focus (i.e., higher prevention score). Between the BIS/BAS and RFQ scales, the BAS scale was negatively correlated with the promotion scale as expected ($r = -.189, p = .006$). People with a stronger approach-orientation (i.e., a lower BAS scale score) tended to also have a stronger promotion-focus (i.e., a higher promotion scale score). A similar negative correlation between the BIS and prevention scales was expected but not supported ($r = .030, p = .666$). Furthermore, there were significant positive correlations between the BAS and prevention scales ($r = .266, p < .001$) and the BIS and promotion scales ($r = .359, p < .001$). People with a weaker approach-orientation (i.e., a higher BAS scale score) tended to have a stronger prevention focus (i.e., a higher prevention scale score), whereas people with a weaker avoidance-orientation (i.e., a higher BIS scale score) tended to have a stronger promotion-focus (i.e., a higher promotion scale score).

Another interesting finding shown in Table 9 is that five variables had a significant correlation with intentions to increase physical activity: BIS scale score ($r = -.151, p = .029$), BAS scale score ($r = -.213, p = .002$), promotion scale score ($r = .155,$

$p = .025$), perceived message believability, ($r = .229, p = .001$), and perceived message emphasis on benefits of being physically active ($r = .138, p = .046$). As previously reported, CFC score was also significantly correlated with intentions ($r = .169, p = .012$). In addition, years with diabetes had a marginally significant correlation with intentions ($r = -.123, p = .075$). A regression model was used to examine the unique influence of these seven variables on intentions while controlling for the others. Age was also included in the model because of its significant correlation with years ($r = .236, p = .001$), BIS scale score ($r = .260, p < .001$), perceived message believability ($r = .137, p = .048$), and perceived message emphasis on benefits ($r = .139, p = .045$). Table 10 presents results of the regression analysis.

Table 10

Summary of Multiple Regression Analysis Predicting Intentions to Increase Physical Activity from Supplemental Analysis Variables

Variable	B	SE	β
Intercept	1.440	0.854	
BIS scale score	-0.374	0.191	-.147
BAS scale score	-0.444	0.205	-.150*
Promotion scale score	0.206	0.168	.098
Perceived message believability	0.413	0.150	.242*
Perceived message emphasis on benefits	-0.132	0.183	-.064
CFC score	0.240	0.141	.122
Years with diabetes	-0.011	0.011	-.070
Age	-0.008	0.008	-.067

$R^2 = .149$

Note. $N = 215$. BIS = Behavioral Inhibition System; BAS = Behavioral Activation System; CFC = Consideration of Future Consequences.

* $p < .05$.

When the eight variables were simultaneously entered as predictors, the overall regression model significantly explained 14.9% of the total variance in intentions to increase physical activity, $F(8, 206) = 4.525, p < .001$. Perceived message believability had the strongest influence on predicting intentions ($\beta = .242, p = .006$). People who perceived the message as more believable tended to have greater intentions to increase physical activity. The only other variable with a significant main effect was the BAS scale score ($\beta = -.150, p < .032$). People with a stronger approach-orientation (i.e., a lower BAS scale score) tended to have greater intentions to increase physical activity.

Chapter Summary

Data were analyzed to test the hypotheses that when message valence and temporal proximity are congruent with individuals' motivational orientation and CFC, respectively, intentions to increase physical activity will be greater than when the message is incongruent with these individual differences. Although analyses did not support the hypotheses, supplemental analyses revealed several interesting correlations among other variables. The next chapter discusses possible explanations for these findings, directions for future research, implications for nursing, and study limitations.

Chapter 5:

Discussion

The present study examined how two individual differences factors – CFC and motivational orientation – combine to moderate message framing effects (temporal proximity and valence) on intentions to increase physical activity. An attempt was made to replicate previous findings (largely from laboratory settings with undergraduate college students) in an at-risk, community population and to extend these findings by exploring relationships not previously tested in message framing health behavior research. The present study was the first to examine message framing effects in an at-risk, community population composed of adults with type 2 DM. It was also the first study to examine the additive effects of both valence and temporal proximity message congruence with individual differences in the same sample. This study was the first health behavior study to draw from an at-risk community population to simultaneously examine the message framing moderator effects of both the approach/avoidance and promotion/prevention motivational orientation systems in the same sample.

Discussion of Findings

Hypotheses testing. Unfortunately, data did not lend support to the hypotheses presented above. Participants who read a health message with a valence frame congruent with their motivational orientation did not show greater intentions to increase physical

activity when compared to those who read a health message that was incongruent with their motivational orientation. Participants who read a health message with a temporal proximity frame congruent with their CFC did not show greater intentions to increase physical activity relative to those who read a health message that was incongruent with their CFC. Several plausible explanations for these discordant findings are explored next.

First, the health behavior examined in the present study (physical activity) may be more complex than behaviors examined in previous studies. For example, most studies that found a moderating effect of motivational orientation or CFC on message framing involved simpler behaviors such as dental flossing (e.g., Mann et al., 2004), vaccination (e.g., Gerend & Sheperd, 2007), sunscreen use (e.g., Orbell & Kyriakaki, 2008), and colorectal cancer screening (e.g., Orbell et al., 2004). In comparison to physical activity, these simpler behaviors typically take less time to perform and may involve just a one-time or “as needed” behavior, whereas increasing physical activity represents a commitment to a lifestyle change with less certain outcomes. Furthermore, the term “physical activity” is more susceptible to multiple interpretations than simpler behaviors such as flossing. As reported above, the wide variability of total weekly baseline physical activity may be attributed, in part, to differences in participants’ perception as to what constitutes physical activity, which may, in turn, influence intentions and behaviors.

Decisions to engage in physical activity on a day-to-day basis may be more sensitive to contextual factors (e.g., physical limitations, acute or chronic health problems, competing demands, family/social support, accessibility, preconceived attitudes, beliefs, and perceptions) than are decisions regarding simpler, less imposing behaviors such as flossing. A few participants in the present study wrote comments on

their completed booklet suggesting their intentions to increase physical activity were thwarted by such factors. For example: “Pool down right now. I have muscle myopathy, degenerative disc disease, and plantar fasciitis, so I am in pain and it is difficult to move;” “Because of a crushed left foot, I have to wear a brace. I can only do light walking around the house.” Thus, it is plausible that message framing effects on complex behaviors such as physical activity are attenuated to a greater degree compared to simpler behaviors, due to the influence of such contextual variables.

Very few studies have assessed the congruence effect of message frame with individual differences on physical activity, thus limiting meaningful comparisons. For example, unlike the present study, Latimer, Rivers, et al. (2008) found support for the “value from fit” hypothesis, particularly in the promotion-focused condition. However, the researchers tested this hypothesis in a low-risk community sample (vs. an at-risk, community population) in which people who had a physical impairment or physician’s recommendation contraindicating unsupervised physical activity participation were excluded from the study.

A second plausible explanation for the present study’s unexpected findings is that adults with type 2 DM have several unique characteristics that distinguish them from the more widely studied college students in controlled laboratory settings or from healthy, low-risk community samples. For example, people with DM often have co-morbid conditions that may affect their decisions to engage in physical activity such as uncontrolled blood pressure, peripheral neuropathy with painful and/or numb lower extremities, uncontrolled blood glucose, and visual problems. In addition, the regimen for self-managing diabetes is one of the most challenging compared to that of other chronic

illnesses (Schillinger et al., 2002). Persons with diabetes may perceive this self-management as invasive because it often requires making difficult lifestyle changes and performing numerous functions. In addition to being physically active, people with diabetes may have to perform tasks such as monitoring blood glucose, taking multiple medications, visiting several health care providers, performing daily foot care, and adhering to a special diet on a daily basis. These and other distinguishable characteristics of the diabetes population pose a challenge to researchers who attempt to extend findings from message framing studies that examined younger, more homogenous, healthier populations.

Strength of the present study's message framing manipulation was explored as a third plausible explanation for discordant findings. Although the overall manipulation check suggested the health messages were perceived as intended, results (mean differences on items in Table 5) also showed that these manipulations have room for improvement. One possible strategy that may have enhanced manipulation strength of the present study's messages would have been to add a survey item asking participants to list their thoughts about the message immediately after reading it. Thought-listing procedures have been used in many message framing studies to elicit greater elaboration upon, and deeper processing of the message, which in turn could strengthen framing manipulation and persuasiveness of the health message. Petty and Cacioppo's (1986) elaboration likelihood model (ELM) posits that a message's persuasive ability to influence behavior change depends on how likely readers will think about the issue or argument. Several variables drawn from ELM have been shown to yield mediating or moderating effects on message framing such as thoughts, source credibility, and argument strength. For

example, Orbell and Kyriakaki (2008) found that thoughts mediated the CFC x temporal proximity framing manipulation.

Jones et al. (2003) found a source credibility x valence frame interaction such that people who read a gain-framed message from a credible source elaborated more and reported more positive exercise intentions and behaviors than participants in the other three conditions (gain-framed/non-credible, loss-framed/credible, loss-framed/non-credible). Simple graphics with a fun, light tone were included in the present study to enhance readability of the message, to more actively engage the reader, and to illustrate examples of physical activity (in order to promote consistency in interpretations). The style of graphics used was similar to styles commonly used in diabetes education materials published by credible health organizations. Although the pilot study with 20 NPs suggested these graphics were appropriate, it is possible the cartoon-like nature of the graphics decreased the message's source credibility, which in turn may have weakened effectiveness of framing manipulation. Lay-people in the community may perceive messages with graphics that have a more neutral, professional quality (e.g., pictures of real objects or real people) as having higher source credibility than messages with graphics that have a less serious, more casual quality (e.g., drawings of objects or cartoon figures). Empirical studies are needed to further explore this idea.

Updegraff et al. (2007) found argument strength moderated the valence congruence effect, suggesting that strong arguments (vs. weak arguments) in favor of a health behavior are needed for motivational orientation to exert an impact on health behavior. Compared to Updegraff et al.'s (2007) operational definitions of weak and strong arguments about dental flossing, the strength of the present study's arguments

about physical activity appear average. This average argument strength may have contributed to the weak congruence effects. Arguments in the present study's message could have possibly been strengthened by including more definitive rather than tentative statements (e.g., "will" vs. "may" or "can") or by adding empirical evidence for being/not being physically active. However, people's perceptions of what makes an argument strong may vary across populations (especially between college students and at-risk community populations) and should be considered when designing health messages. Perceptions may also vary based on the health behavior being studied.

Consideration of how a message's outcome focus may moderate framing effects is another strategy that could enhance framing manipulation. Yi and Baumgartner (2009) found that outcome focus (gain end-state vs. loss end-state) moderated valence framing effects. Gain-framed messages were more persuasive with a gain end-state (presence of gain) than with a loss end-state (absence of loss), whereas loss-framed messages were more persuasive with a loss end-state (presence of loss) than with a gain end-state (absence of gain). All versions of the health message in the present study presented arguments with a gain end-state (i.e., presence or absence of gain). The framing manipulation may have possibly been strengthened if actual losses versus missed gains would have been presented in the loss-framed messages (e.g., "less energy and worse sleep" vs. "miss out on more energy and better sleep").

Another strategy that may improve framing manipulation is to consider possible effects that people's beliefs about health behaviors may have on their decisions to perform these behaviors. People who believe physical activity is painful, is not beneficial, and is limited to only rigorous exercise may be less likely to increase physical activity

after reading a congruent framed message than people who believe physical activity is fun, easy, and yields multiple benefits. Had a pre-manipulation measure to assess beliefs about physical activity been included in the present study, beliefs could have been examined as a covariate, which in turn may have statistically strengthened the framing manipulation.

Consideration should also be given to the effects various operational definitions and uses of message framing may have on manipulation strength. As the literature indicates, there is wide variation among studies with regard to how message frames are manipulated and how these frames (e.g., gains and losses) are operationally defined. In studies that examined approach/avoidance motivational orientation systems, Rothman and Salovey's (1997) traditional approach (based on prospect theory, Kahneman & Tversky, 1979) was used to define gains and losses in terms of valence frame (e.g., Mann et al., 2004; Sherman et al., 2006). With this approach, gain-framed messages can be presented as presence of gains or absence of losses, and loss-framed messages can be presented as presence of losses or absence of gains. An alternative operational definition of gains and losses has been used in studies that examined promotion/prevention motivational orientation systems (e.g., Latimer, Rivers, et al., 2008). Based on Higgins' (1997, 1998, 1999) regulatory focus theory, gains and losses refer to "end-states" of a behavior. With such an approach, messages with a gain end-state (positive outcome focus) depict a presence or absence of gains, whereas messages with a loss end-state (negative outcome focus) depict a presence or absence of loss. Study designs also vary as to whether messages present a single frame or a mixed frame. Most studies that involved only valence framing used just one valence frame per message. Single valence framed

messages (gain or loss) have been shown to be more persuasive than mixed valence framed messages (gain and loss) (e.g., Latimer, Rench, et al., 2008). However, in studies that examined CFC, mixed valence and mixed temporal (immediate and future) framed messages have been shown to moderate effects of the CFC x temporal frame interaction on the promotion of health behaviors (e.g., Orbell & Kyriakaki, 2008).

The present study used Rothman and Salovey's (1997) traditional approach to define gains and losses but did not use Higgins' (1997, 1998, 1999) approach. Had Higgins' concept of outcome focus/end-states been considered when designing the four message versions, valence congruence of messages with people's regulatory focus (promotion or prevention) may have been strengthened. Several studies have tested the moderating effect of regulatory focus on outcome focus, but findings are mixed. Some studies lend support for the predicted moderating effect (e.g., Latimer, Williams-Piehota, et al., 2008), while other studies do not (e.g., Yi & Baumgartner, 2009). The present study presented only one valence and one temporal frame per message. Had this study presented mixed versus single frames, temporal proximity congruence of messages with people's CFC may have been strengthened, but valence congruence with motivational orientation may have simultaneously been weakened. Furthermore, where this mixed frame approach may be more persuasive with college students and healthy community samples, it may be less persuasive or even counter-productive with at-risk populations. When delivering a message to people with diabetes about the promotion of regular physical activity, emphasizing losses they will experience as well as gains (regardless of temporal frame) may be less effective than a message that emphasizes only benefits of physical activity, and in fact may actually dissuade someone from doing physical activity

at all. This reasoning is consistent with Rothman and Salovey's (1997) hypothesis that gain-framed messages are more persuasive than loss-framed messages for prevention behaviors.

"Dose" of message frame may also affect strength of the manipulation. Dose refers to the frequency of delivering framed messages. Most studies have used a "single dose" approach, where participants read a framed message at a single point in time and outcome variables were assessed one time after reading the message. A few studies have used a "multi-dose" approach, where participants read a framed message at multiple points in time and outcome variables were assessed at different intervals. Studies have shown that framing manipulation was more effective in promoting healthy behaviors when a "multi-dose" approach was used compared to a "single-dose" (e.g., Latimer, Rench, et al., 2008).

Methodological differences among studies were explored as a fourth possible explanation for the present study's discordant findings. This study was the first to represent temporal proximity and valence congruence with variables constructed from conditional transformations on the corresponding individual differences scale scores (CFC, BIS/BAS, and RFQ) and to examine the congruence effect by testing for significance of zero-order correlations of the congruence variables with the outcome variable. This innovative, intuitive approach differs from the usual approach of representing congruence with a message frame x individual differences interaction term and examining the congruence effect by testing for significance of the interaction. Researchers also vary in how they treat individual differences scale scores. Some researchers analyze the scores as continuous variables and use multiple regression to test

the congruence effect (e.g., Mann et al., 2004), while others treat the scores as dichotomous variables (usually via median split) and use an ANOVA to test the congruence effect (e.g., Orbell et al., 2004; Sherman et al., 2006). Maxwell and Delaney (1993) caution researchers who use bivariate median splits that they may lose power to detect true predictor-criterion relationships in some situations or they may dramatically increase the probability of Type I errors in other situations. To avoid such potential problems, the present study treated scale scores as continuous.

In order to evaluate the present study's novel approach and to ensure this approach did not obscure message framing effects, data were also analyzed using the two traditional approaches. Even when the data were treated the same as in earlier studies (tests of interaction), there was no support for any congruence effect. This suggests the present study's approach for operationalizing congruence was not responsible for the negative findings obtained.

Another way researchers vary in how they treat individual differences scale scores relates particularly to scales that are made up of two or more "subscales". For example, with the BIS/BAS and RFQ scales, some researchers analyze separately the two "subscales" to test hypotheses (e.g., Yi & Baumgartner, 2009), whereas other researchers (as in the present study) combine the two "subscales" into a single index and analyze the index to test hypotheses (e.g., Latimer, Williams-Piehot, et al., 2008; Mann et al., 2004). Variations also exist in how researchers combine these "subscales"; some subtract while others add the two scores. Still another difference among studies relates specifically to those that use the BIS/BAS scale. Carver and White's (1994) original BAS scale consisted of three separate scales: BAS Reward Responsiveness, BAS Drive, and BAS

Fun Seeking. Because these three scales appear strongly related, researchers often combine them and use one BAS scale to analyze data (as in the present study) (e.g., Gerend & Shepherd, 2007; Sherman et al., 2006). Other researchers analyze one or more BAS “subscales” separately (e.g., Yi & Baumgartner, 2009).

Another methodological difference among studies that should be considered is the use of various measures to assess the same individual differences constructs. In addition to Strathman et al.’s (1994) CFC scale, the Zimbardo Time Perspective Inventory (Zimbardo & Boyd, 1999) is another commonly used measure of future orientation. Lockwood et al.’s (2002) regulatory focus scale and Higgins et al.’s (2001) RFQ scale are the most widely used measures to assess regulatory focus. However, other measures have also been used such as Carver and White’s (1994) BIS/BAS scale (e.g., Yi & Baumgartner, 2009). Based on convergent and discriminant validation principles (Campbell & Fiske, 1959), one would expect these measures of regulatory focus to behave similarly; however, inconsistencies have been found.

While the ideas of approach/avoidance and promotion/prevention motivational orientation have distinct differences, they also appear related. An approach strategy is usually taken for promotion, and an avoidance strategy is usually taken for prevention (Higgins, 1997; Higgins et al., 2001). Similar behavioral predictions about message framing effects have been made for approach-oriented and promotion-focused people, as well as for avoidance-oriented and prevention-focused people (e.g., Lee & Aaker, 2004; Mann et al., 2004; Rothman et al., 2008). Although these two ideas have been examined in separate studies, only one health behavior study has simultaneously examined both constructs in the same sample.

Yi and Baumgartner (2009) conducted a laboratory experiment with 120 undergraduate college students to examine whether the moderator effects of regulatory focus on message framing effectiveness depended on the way regulatory focus was measured. They used a 2 (overall valence) x 2 (outcome focus) x 2 (type of benefit/harm emphasized) within-subjects factorial design to develop messages about regular fruit and vegetable intake. Participants read all versions of the health message in a randomly assigned order and rated perceived persuasiveness of each message using a one-item measure. Chronic regulatory focus was then assessed in a questionnaire that included Higgins et al.'s (2001) RFQ scale, Lockwood et al.'s (2002) regulatory focus scale, and Carver and White's (1994) BIS/BAS scale. Discrepancies were revealed among the prevention-related scales but not the promotion-related scales.

Yi and Baumgartner (2009) found partial support for Mann et al.'s (2004) congruency hypothesis and Higgins' (2000) "value from fit" hypothesis. The valence main effect was moderated by regulatory focus when this individual difference was assessed using Lockwood et al.'s (2002) prevention focus scale and Carver and White's (1994) BIS scale. The gain-framed advantage was less pronounced among participants with a strong prevention focus than those with a weak prevention focus. However, this interaction was not observed when using Higgins et al.'s (2001) prevention scale. Regardless of which promotion scale was used, the valence main effect was not moderated by regulatory focus. The gain-framed advantage was not more pronounced among participants with a strong promotion focus than those with a weak promotion focus.

The present study extends Yi and Baumgartner's (2009) research beyond a laboratory setting with college students to a community setting with an at-risk population by administering both the RFQ and BIS/BAS scale to participants and comparing valence congruence effects. Whereas Yi and Baumgartner (2009) separately analyzed the two RFQ and BIS/BAS "subscales" to test for congruence effects, the present study analyzed conditionally transformed single index scores to test the congruence hypotheses. Unlike Yi and Baumgartner (2009), the present study found congruence effects were absent regardless of the measure used to assess regulatory focus. Neither valence congruence variable yielded an effect as evidenced by non-significant (and very small) zero-order correlations with intentions. These inconsistent findings between studies could be related to several factors such as differences among participants, different study settings, and different approaches in using and analyzing the RFQ and BIS/BAS scales.

A fifth and final possibility that was explored as a potential contribution to the present study's findings was whether the participants in the sample varied on individual differences measures when compared to participants in other studies. Normative values for the CFC, RFQ, and BIS/BAS scales have not been reported in the literature; therefore, mean scores from this study were compared to mean scores in other health behavior studies. It is important to note that some studies failed to report mean scores, so only a few comparisons could be made. Studies in which comparisons were made involved university campus or healthy community samples rather than at-risk populations; therefore, caution should be taken when interpreting results.

For the CFC scale (scale range 1 to 5), mean score (*SD*) in the present study was 3.43 (0.71) compared to the following studies: 3.20 (0.66) (Orbell et al., 2004); 3.25 (0.96) (Orbell & Hagger, 2006); 3.30 (0.69) (Orbell & Kyriakaki, 2008, Experiment 1); 3.31 (0.54) (Orbell & Kyriakaki, 2008, Experiment 2); and 3.20 (0.70) (Adams & White, 2009). For the RFQ scale (scale range 1 to 5), mean scores (*SD*) in the present study were 3.53 (0.66) and 3.46 (0.83) for the promotion and prevention scales, respectively, compared to the following studies: 3.72 (0.59) and 3.20 (0.88) (Fuglestad, Rothman, & Jeffery, 2008, Study 1A) and 3.69 (0.60) and 3.47 (0.87) (Fuglestad et al., 2008, Study 1B). Neither the means nor standard deviations on the CFC and RFQ scales in this study's sample appear to differ from means and standard deviations in other studies' samples. These data suggest at-risk populations are similar to healthier community and university campus populations in both CFC and regulatory focus. Because response metrics widely vary across studies employing the BIS/BAS scale, it is difficult to make meaningful comparisons among the scale means.

Mail survey. The present study also provided some information on the effectiveness of Dillman's Tailored Design Method (TDM) (Dillman et al., 2009) as a recruitment procedure (results in Table 3). This study was one of the first in the health behavior message framing literature to use the TDM. Consistent with other studies that have used this approach, an overall response rate of 54% was obtained, well above the 25-35% response rate that "one-shot" bulk mailing approaches typically yield. Results also indicate the multiple contact design of the TDM was effective. The initial prenotice letter and booklet of measures with cover letter yielded an initial response rate of 46%. The subsequent mailing of reminder/thank you postcards and replacement booklets (as

applicable) increased the response rate to 54%. Although the TDM approach used in this study was more expensive and more labor intensive than a one-time mail survey, it appeared to be more successful.

Over the past decade, there has been a dramatic rise in use of the Internet and e-mail to conduct surveys. While electronic surveys may offer potential benefits (e.g., cost savings, greater efficiency) over mail surveys in certain populations (e.g., professional associations, university students), this mode of delivery is not always a suitable replacement for the mail mode. Although both Internet access and computer operation skills have substantially improved in recent years, significant proportions of the U.S. population remain without the technology or ability. Other challenges are the lack of standards on how to create e-mail addresses (in order to develop sampling algorithms) and the lack of a systematic list of Internet users from which to draw a sample (Dillman et al., 2009). These complications and potential difficulties for the target population of adults with type 2 DM were weighed in the decision to use the mail mode over the electronic mode.

Supplemental analyses. Several interesting findings emerged from supplemental analyses that were conducted in the present study. Perceived believability of the health message yielded the strongest influence on predicting intentions to increase physical activity while controlling for the influence of seven other variables using multiple regression (results in Table 10). Strategies on how to increase believability of messages need to be further explored. In the present study (results in Table 9), believability was positively correlated with age ($r = .137, p = .048$). People who were older tended to perceive the health message as more believable. This pattern was not significantly

different across the four conditions. This finding raises important questions. What features of a message design make it appear more believable to younger people versus older people? What individual differences vary between younger and older people that may affect perceptions of message believability (e.g., thought processes, beliefs, attitudes, past events)? Do these differences exist in other at-risk or healthier populations? These and other relevant questions need to be studied in order to guide nursing practice.

Message believability was also positively correlated with the RFQ's promotion scale score ($r = .178, p = .010$). People who had a stronger promotion focus tended to perceive the health message as more believable. This suggests the possibility that if a person's promotion focus could be increased prior to reading a message, believability of the message may be increased, which may in turn increase intentions to perform healthy behaviors. Although regulatory focus is thought to be a relatively stable construct, Higgins (1997) posits that momentary situations can temporarily induce either a promotion or prevention focus. A few health behavior studies lend support for this hypothesis (e.g., Lee & Aaker, 2004).

Message believability was also positively correlated with CFC scale score ($r = .225, p = .001$). People who were more future-oriented tended to perceive the health message as more believable. Although a person's CFC is less likely than regulatory focus to be affected by situational manipulation, recent findings have emerged that suggest CFC may be a changeable construct over time (e.g., Toepoel, 2010) such as when people experience a significant event (e.g., develop a chronic disease) or a dramatic change in their life (e.g., change in socioeconomic position). In the present study, CFC score was

negatively correlated with BMI ($r = -.193, p = .005$). People with a higher future orientation tended to have a lower BMI. Adams and White (2009) found a similar correlation, as well as a positive correlation between socioeconomic position (SEP) and CFC score. People who were less deprived tended to be more future-oriented. In addition, they found that CFC score partially mediated the negative relationship between SEP and BMI. These findings suggest CFC may play an important role in promoting healthy behaviors that will lead to desirable health outcomes. These and other situational, health, and lifestyle variables need to be further explored to identify factors that may increase a person's CFC over time and thus improve their attitude towards healthy behaviors.

BAS scale score yielded the second strongest influence on predicting intentions to increase physical activity, while controlling for all other variables in the supplemental analysis regression model. BAS and BIS brain systems have been found to be stable constructs, and little is known as to whether they are changeable.

As reported in Table 6, BIS/BAS and RFQ single index scores were positively correlated as expected ($r = .441, p < .001$). The more approach-oriented people tended to be more promotion-focused, and the more avoidance-oriented people tended to be more prevention-focused. As an extension of Yi and Baumgartner's (2009) research, correlations within and between the scales' "subscales" were examined to further explore the relationship between these two motivational orientation measures (results in Table 9). Due to reverse coding between scales, comparisons are not intuitive, however. A low score on the BIS or BAS scale represents a stronger avoidance or approach orientation, respectively, whereas a low score on the RFQ's prevention or promotion scale represents a weaker prevention or promotion focus, respectively.

According to Carver and White (1994), the BAS and BIS scales should be orthogonal, where any combination of scores is possible (e.g., strong approach/strong avoidance, strong approach/weak avoidance, weak approach/weak avoidance, strong avoidance/weak approach). The present study contradicts this prediction. BAS and BIS scores had a significant positive correlation ($r = .203, p = .003$), suggesting they were not orthogonal. This finding differs from studies that have found non-significant correlations between BAS and BIS scales (e.g., Gerend & Shepherd, 2007; Mann et al., 2004; Shen & Bigsby, 2010; Shen & Dillard, 2009; Updegraff et al., 2007; Yi & Baumgartner, 2009). All of these studies were with college students, suggesting the concept of orthogonality between the BAS and BIS scales may not generalize from a controlled laboratory setting to a non-controlled, community setting.

Similar to the BAS and BIS scales, the RFQ's promotion and prevention scales are expected to be orthogonal (Higgins et al., 2001), where any combination of scores is possible (e.g., strong promotion/strong prevention, strong promotion/weak prevention, weak promotion/weak prevention, strong prevention/weak promotion). Promotion and prevention scores had a marginally significant positive correlation ($r = .129, p = .063$) in the present study. In comparison to other studies conducted in community settings, some have found similar significant positive correlations between the promotion and prevention scales (e.g., Fuglestad et al., 2008, Studies 1A & 1B) whereas others have not (e.g., Haaga, Friedman-Wheeler, McIntosh, & Ahrens, 2008, Study 1). As with the BAS and BIS scales, these findings suggest the concept of orthogonality between the promotion and prevention scales may not consistently emerge in community settings as they do in laboratory settings with college students.

To further explore the relationship between BIS/BAS and RFQ scales, intercorrelations between these scales' "subscales" were examined. Based on predictions that "promoters" are similar to "approachers" and "preventers" are similar to "avoiders" and that BAS and BIS scales and promotion and prevention scales are orthogonal, the following correlations were expected (using the reverse coding interpretation as previously described and convergent and divergent validation principles [Campbell & Fiske, 1959]): BAS and promotion scales should be negatively correlated; BIS and prevention scales should be negatively correlated; BAS and prevention scales should be weakly correlated; and BIS and promotion scales should be weakly correlated. Only one of these four predictions was supported in the present study: BAS scores were negatively correlated with promotion scores ($r = -.189, p = .006$). Contrary to expectations, BIS scores were not correlated with prevention scores ($r = .030, p = .666$), BIS scores were correlated with promotion scores ($r = .359, p < .001$), and BAS scores were correlated with prevention scores ($r = .266, p < .001$). These results were compared to Yi and Baumgartner's (2009) findings, who split the BAS scale into two separate scales when making comparisons rather than using a single BAS index score (as in the present study).

Yi and Baumgartner (2009) also found the expected correlation between the promotion and BAS scales, but only with one of the BAS scales (BAS-drive). Similar to the present study, no correlation was found between the BIS and prevention scales as expected. Furthermore, a similar unexpected significant correlation between the BIS and promotion scales was also found, where weaker "avoiders" tended to be stronger "promoters". However, a correlation was not found between either of the BAS scales and

the prevention scale as it was with the present study (where weaker “approachers” tended to be stronger “preventers”).

Summerville and Roese (2008) conducted a principal components analysis (non-health behavior study) with college students to compare the BIS/BAS and RFQ scales (using “subscale” scores for comparison). As with both the present study and Yi and Baumgartner’s (2009) study, Summerville and Roese (2008) found the expected correlation between the BAS and promotion scales but found no correlation between the BIS and prevention scales. (They did not report correlations between the BAS and prevention and BIS and promotion scales).

In summary, findings among these three studies suggest correlations within and between the BIS/BAS and RFQ “subscales” are unclear and do not consistently “behave” across populations and settings as originally predicted. These findings may partially explain the discordant results in the present study. Whereas neither the BIS/BAS nor RFQ single motivational index score was correlated with intentions to increase physical activity (results in Table 6), three (BIS, BAS, and promotion) of the four “subscales” were correlated with intentions (results in Table 9). These findings suggest that using separate “subscale” scores versus single index scores may better represent people’s true approach/avoidance and promotion/prevention motivational orientation systems, which may in turn strengthen congruence effects of a framed message with motivational orientation. Summerville and Roese (2008) suggest another possible explanation for inconsistent findings between the BIS/BAS and RFQ scales. Although both scales are common measures of the broad “motivational orientation” construct, unique differences exist between the more specific constructs that each scale measures. Therefore, caution

should be exercised when comparing results between different measures of motivational orientation.

Directions for Future Research

As the literature indicates, there is a paucity of studies that have evaluated the congruence effect of message framing with individual differences in at-risk populations involving complex health behaviors. Findings from the present study need to be replicated and extended to other at-risk populations and behaviors. Several themes emerged from this study that can serve as a useful guide to future message framing and message tailoring in health care research.

First, contextual variables associated with at-risk populations and complex health behaviors need to be identified and their effects controlled for, which may in turn strengthen message framing effects on behaviors. Second, various strategies need to be tested under multiple conditions to identify effective ways to strengthen manipulation of framed messages such as the following: 1) inclusion of a thought-listing task post-manipulation; 2) manipulation of graphics (no graphics vs. cartoon-like graphics vs. more neutral and “real life” graphics); 3) manipulation of argument strength (e.g., tentative vs. definitive arguments; empirical data vs. no empirical data); 4) consideration of a message’s outcome focus (presence of loss vs. absence of gain; presence of gain vs. absence of loss); 5) manipulation of how messages are framed and designed in various combinations (traditional gain-framed vs. loss-framed; gain end-state vs. loss end-state; single frame vs. mixed frame vs. no frame); and 6) manipulation of message “dose” (single dose vs. multiple doses).

Third, various strategies need to be tested to identify effective ways to strengthen perceived believability of health messages, which may in turn optimize persuasiveness of these messages and ultimately lead to an increase in healthy behaviors. Consideration should be given to variables with which believability has been shown to correlate. In the present study, age positively correlated with believability. This relationship needs to be more closely examined to identify how perceptions of specific message characteristics differ among various age groups. This, in turn, will guide nurses and other health care providers to design tailored messages that match specific age-groups.

Fourth, the relationships of individuals' promotion-focus motivational orientation and CFC with their intentions to perform healthy behaviors need to be further explored. In the present study, these two individual differences were positively correlated with both intentions and message believability. Findings from studies that have shown a person's regulatory focus can be temporarily manipulated to enhance the valence congruence effect with a particular message need to be replicated in at-risk populations. Situational, health, and lifestyle variables that may be related to CFC should also be explored to identify nursing interventions that may contribute to increasing a person's CFC over time, which may in turn strengthen effectiveness of gain-framed messages on promoting healthy prevention behaviors.

Fifth, relationships within and between motivational orientation measures (e.g., RFQ and BIS/BAS scales) need to be further examined in at-risk populations. Data need to be analyzed using both composite single index scores and separate "subscale" scores in the same sample to determine if one approach more truly represents people's motivational disposition than the other. A more precise measurement may in turn

strengthen valence congruence effects. In the future, researchers could replicate the present study's design (incorporating the suggestions to strengthen framing manipulation as discussed above) but also include Lockwood et al.'s (2002) regulatory focus scale as a third measure of motivational orientation. Studies suggest the regulatory focus scale behaves similarly to Carver and White's (1994) BIS/BAS scale in laboratory settings with college students (e.g., Summerville & Roese, 2008; Yi & Baumgartner, 2009).

Strong evidence has shown that wide variability exists among message framing health behavior studies. This variability poses a challenge when trying to compare previous findings, which in turn makes it difficult to draw firm conclusions and formulate definitive clinical practice recommendations. Although three broad meta-analysis papers on message framing research were conducted in an attempt to synthesize the literature (Kühberger, 1998; O'Keefe & Jensen, 2006, 2007), all three fell short of providing an adequate, comprehensive review (as presented in Chapter 2). Systematic reviews are needed that include comparisons of study characteristics such as research design, underlying theoretical conceptual framework, research setting, sample description, nature of the health problem (hypothetical vs. real), dependent variables, moderating variables, and measures employed.

Latimer, Brawley, and Bassett (2010) recently conducted a focused systematic review to evaluate the effectiveness of three approaches for constructing physical activity messages: message tailoring, message framing (in terms of gains vs. losses), and targeting messages to change self-efficacy. They reviewed only six studies that examined the effects of valence framed messages on physical activity behavior and/or intentions. Compared to the other three meta-analyses, Latimer et al.'s (2010) review included more

meaningful comparisons across studies to facilitate identification of trends and patterns. However, their review was underpowered, so definitive practice recommendations could not be made. Studies that involved at-risk clinical populations (e.g., people with diabetes) were excluded from their review, thus further limiting generalizability of findings. Future systematic reviews using similar methods employed by Latimer et al. (2010) need to be conducted with studies that involved at-risk populations and complex health behaviors.

The present study's inconsistent findings with theoretical predictions about congruence effects of message framing with individual differences suggest that underlying theories and conceptual frameworks may need refinement to more accurately predict congruence effects on complex health behaviors in at-risk community populations. Predictions as originally hypothesized may not generalize from controlled laboratory settings to real-life, volatile settings. Future research is essential to guide these theoretical revisions and to continue advancing the message framing literature.

Implications for Nursing Research, Education, and Practice

Findings from the present study offer important implications for nursing research, education, practice. There is an international call for an increase in health communication research as one strategy to address the global epidemic of chronic diseases (e.g., DHHS, 2000b). There is a paucity of published empirical studies that adequately examine health care provider educational interventions and the effectiveness of these interventions in contributing to desired outcomes. Coster and Norman (2009) report on findings of a review of 30 Cochrane systematic reviews of educational interventions designed to improve patients' knowledge and skills to manage chronic disease, with particular reference to nursing contribution and practice. The majority of reviews (60%) were

judged to provide inadequate evidence of the effectiveness of the interventions. This insufficient evidence, coupled with lacking quality of several trials that were evaluated, limited Cochrane reviewers' ability to draw firm conclusions on the effectiveness of educational interventions and to make specific clinical practice recommendations. Future experimental studies are needed to help identify the "ingredients" of successful messages (e.g., gain vs. loss-framed) that health care providers deliver to their patients, with an emphasis on how to tailor these "ingredients" based on individual differences among their learners.

Message framing is a promising health communication strategy that has been well-studied in the psychology literature over the past 20-plus years across a breadth of health behaviors. However, most of these studies were conducted in a laboratory setting with college students (sometimes using hypothetical health problems) rather than in an at-risk community population with actual health problems. Nurse researchers are well connected to various clinical settings and thus have an opportunity to help fill in this literature gap by addressing questions previous findings of message framing effects have raised in relation to health care provider educational interventions. For example, when delivering diabetes self-management education to adults with type 2 DM, is a gain-framed or loss-framed message more effective in promoting regular physical activity? What individual differences among these learners moderate or mediate message framing effects, such as future orientation, motivational orientation, age, and beliefs? What other types of message manipulation may relate to valence framing, such as temporal proximity, argument strength, source credibility, and use/appearance of graphics? How should providers customize their messages based on differences in dispositional and

situational factors in order to maximize persuasiveness of the message on increasing physical activity? Studies such as this example which involve other highly prevalent chronic diseases (e.g., cardiovascular disease and cancer) and associated modifiable health behaviors (e.g., unhealthy diet and tobacco use) may provide empirical answers to these questions and strengthen researchers' ability to ascertain what educational interventions will work for whom and in what situations. Such studies will also respond to the international call for increased health communication research. Nurses have a prime opportunity to be on the cutting edge of message framing research in clinical settings involving at-risk populations that will help guide the practice of health care providers in various disciplines in delivering influential messages to their patients. Research alone, however, is insufficient to achieve this desired goal. The valuable role of education must also be considered.

Nurses and other health care providers require adequate knowledge and skills to successfully apply and incorporate research findings into their communication and education practices. However, providers vary in their own communication abilities, and there is a scarce amount of suitable training opportunities to enhance these skills (Astin & Closs, 2007; Kim et al., 2008; WHO, 2005a). The WHO (2005a) reports that training of the international health care workforce has generally not kept pace with the rapid escalation of chronic health problems and that the workforce demonstrates a lack of training, education, and skill set to effectively manage patients with chronic conditions. This is largely related to challenges encountered during the recent transformation from the traditional provider-centered approach (which emphasized treating acute, episodic illnesses) to the contemporary patient-centered approach (which emphasizes promoting

health and preventing chronic conditions and associated complications). The WHO (2005a) presents a new and expanded training model that consists of five core competencies which augment rather than replace existing competencies and can be implemented in a variety of training contexts. This model is designed to help expand the skills of all health care providers to meet the new complexities associated with the chronic disease epidemic. The first competency in this model – patient-centered care – is particularly relevant to the health communication literature as it includes the following main components: interviewing and communicating effectively, assisting changes in health-related behaviors, supporting self-management, and using a proactive approach. Astin and Closs (2007) comment on how the WHO report (2005a) can be specifically applied to nursing, particularly the patient-centered care competency. They suggest that little has been done to equip nurses with the adequate knowledge and skills required to deliver self-management education and thus call for greater training opportunities.

Health care providers in general need to be competent in delivering educational messages. Offering multiple training opportunities in various settings and contexts will enhance the ability of providers to effectively educate and motivate their patients to better care for themselves. For example, in nursing academic programs, therapeutic nurse-patient communication and education is a learning objective that cuts across a broad spectrum of health behaviors associated with chronic disease management and prevention. Therefore, components of health communication research should be woven throughout the curricula of all relevant courses in the program. In clinical settings, on-site workshops might be offered or off-site education could be made available to nursing staff. Interactive exercises may especially be useful when teaching communication skills,

such as audio-/videotaping learners during role-play scenarios and playing back these tapes for learners and peers to critique their own performance. Less formal educational opportunities such as independent learning (e.g., handbooks and online literature reviews) and real-time, “on-the-job” mentoring may also be valuable and promote reinforcement and enhancement of these learned skills. In addition to health communication approaches, providers also need to be familiar with situational and dispositional factors that have been shown to impact persuasiveness of approaches like message framing.

As with any training, initial and ongoing competence needs to be assessed, which is consistent with the WHO’s (2005a) model. For example, ability to execute effective communication strategies might be evaluated via methods such as asking learners to develop tailored written or verbal health behavior messages (e.g., gain- vs. loss-framed; immediate vs. distal framed) and then deliver these messages in various contexts such as simulation, role playing, or demonstration with the target audience. Similar activities could be done where learners practice increasing believability of their message by tailoring it to specific individual differences such as age-specific characteristics. Opportunities for learners to practice strategies shown to temporarily alter patients’ regulatory focus to increase congruence and effectiveness of a framed message should also be provided, as well as strategies shown to increase CFC over time. Health care providers’ competence in skills such as these is necessary to help maximize the potential practice implications of well-established health communication strategies.

Researchers have found that health care provider educational interventions for patients with chronic conditions such as diabetes, asthma, and epilepsy can increase knowledge, promote adoption of healthy self-management behaviors, and improve health

status (see Barlow, Wright, Sheasby, Turner, & Hainsworth, 2002; Coster & Norman, 2009). Most importantly, these benefits help patients experience better overall health and quality of life. These desired outcomes are also valuable to providers themselves. For example, reimbursement for services to clinicians such as nurse practitioners and physicians is often tied to how successful their patients are at achieving targeted clinical goals such as normal hemoglobin A1C, blood pressure, and blood lipid levels. Clinicians are well aware of these goals but struggle to obtain them, largely related to patient education issues.

As part of a patient-centered approach, a vast amount of teaching aimed at promoting healthy behaviors may be required for patients with chronic conditions and related co-morbidities. Well-established health communication strategies such as message framing and other types of message tailoring may accelerate the speed in which patients adopt these behaviors. Health care providers report several barriers to providing effective educational interventions such as lack of knowledge of well-established strategies, lack of confidence in ability to implement these strategies, lack of time to personally deliver health education, and lack of communication aids to reinforce and support this education (see Coster & Norman, 2009; Kim et al., 2008). Message tailoring is an approach that offers promise in its potential to help lessen these barriers.

Health care providers often use printed materials to deliver patient education. It is usually preferable to use these materials in conjunction with personally delivered education to help reinforce and support the messages. In reality, however, printed materials are often used as the only means to educate patients, largely due to insufficient time for personal delivery of the messages. Thus, it is essential to have adequate materials

that either alone or coupled with personal education are highly persuasive in promoting healthy behaviors. Most printed materials utilized are from the health care industry (e.g., pharmaceutical and medical supply companies) and are not always readily available to providers. In addition, these materials often contain biased, branded, inadequate information, are written at unacceptable reading and readability levels, and are not modifiable to account for individual differences in learners. These limitations weaken the persuasive power of these materials and may even render them ineffective and meaningless to patients. As a result, providers may be required to design their own printed materials. Principles of message framing and other message tailoring strategies can help guide nurses and other providers in developing customized materials to enhance overall effectiveness of educational interventions.

In addition to written materials, message framing has potential for delivering less formal, verbal health messages. As part of the initial assessment, where providers should routinely assess patient characteristics like readiness to learn and preferred learning styles prior to providing education, providers could also evaluate individual characteristics that have been shown to moderate message framing effects on health behaviors (e.g., motivational orientation and CFC). Many of these characteristics can quickly be assessed using short, well-established instruments. Providers could then use these findings to customize the verbal message (e.g., gain vs. loss or immediate vs. distal) to be most congruent with their patient's characteristics (e.g., approach- vs. avoidance-oriented or low vs. high CFC). This strategy can be used to deliver education in a variety of clinical settings such as informally at the bedside or formally during a structured teaching session.

All messages, regardless of the medium through which they are delivered, need to be appropriately customized. Knowing the right combination of “ingredients” that are maximally congruent and most effective with specific populations under a variety of circumstances will assist providers and the health care industry to formulate “optimally” tailored messages to help maximize their persuasiveness in promoting behavior change and hastening attainment of targeted goals.

Study Limitations

Some limitations should be kept in mind when considering results of the present study. First, the sample was non-random and composed of adults with type 2 DM from a single metropolitan area in the Southeastern United States (Tampa Bay) who had been seen by one of two health care providers (an endocrinologist or an ARNP) specializing in diabetes management. As a result of sampling bias, participants in this study may not have been representative of all adults with type 2 DM in the Tampa Bay area. Second, the mail survey showed a selection bias; of the 441 deliverable surveys, 155 (35%) were not returned. No demographic information was obtained from the non-respondents; therefore, comparisons could not be made to those who did respond. Because the study design compared groups of respondents that were created by random assignment, the selection bias issue seems somewhat trivial and most likely had a minimal effect on the findings. Third, the data collected were obtained from self-reports. As with all self-report information, these data may reflect bias in reporting certain thoughts, feelings, and actions.

Fourth, the effects of omitted variables (e.g., beliefs about physical activity, physical limitations, and current health condition) are unpredictable. Their absence could

contribute to misleading conclusions with regard to message framing effects on intentions to increase physical activity. Fifth, all participants received a booklet of materials presented in the same exact order, with individual differences scales placed after the health message, manipulation check, and intention items. Whereas many other message framing studies used a similar order (e.g., Gerend & Shepherd, 2007; Orbell & Kyriakaki, 2008; Yi & Baumgartner, 2009), a few presented individual differences measures before the health message (e.g., Mann et al., 2004; Uskul et al., 2009). While it is unlikely that reading a health message would affect responses on scales that measure relatively stable individual differences, having not counterbalanced the sequence of materials, the possibility of order effects cannot be ruled out.

The present study contributes to the message framing literature in that it is only one of a few that examined framing effects on a complex health behavior in a widely understudied at-risk population. This study also introduced a new approach for operationalizing valence and temporal proximity congruence as a continuous variable using conditional transformations. Plausible explanations for this study's negative findings were thoroughly explored, and supplemental analyses were conducted to help guide future research and theory refinements. Implications of message framing and other message tailoring strategies for nursing research, education, and practice were also discussed.

Although health psychology has generated many interesting approaches for improving people's health through promoting behavioral change, much of the work in this field may be described as basic research (using college students) that is aimed at clarifying constructs and establishing principles. In contrast, much of nursing research

may be described as applied research aimed at solving challenging problems using practical means in "real world" settings. Psychology theory coupled with nursing practice is an untapped partnership that has exciting possibilities. Collaboration between nurses and health psychologists will bring about a richer understanding of how to employ a patient-centered approach to effectively get health messages across to at-risk community populations. This enhanced understanding will better equip nurses and other health care providers to design and deliver appropriately tailored health messages in order to optimize promotion of healthy self-management behaviors and ultimately contribute to a reduction in the burdensome impact of chronic diseases throughout the world.

List of References

- Abegunde, D. O., Mathers, C. D., Adam, T., Ortegón, M., & Strong, K. (2007). The burden and costs of chronic diseases in low-income and middle-income countries. *Lancet*, *370*, 1929-1938.
- Adams, J., & White, M. (2009). Time perspective in socioeconomic inequalities in smoking and body mass index. *Health Psychology*, *28*, 83-90.
- Ajzen, I. (1985). From intentions to actions: A theory of planned behavior. In J. Kuhl & J. Beckmann (Eds.), *Action-control: From cognition to behavior* (pp. 11-39). Heidelberg: Springer.
- Ajzen, I. (1988). *Attitudes, personality, and behavior*. Chicago: Dorsey.
- Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, *50*, 179-211.
- Ajzen, I., & Fishbein, M. (Eds.). (1980). *Understanding attitudes and predicting social behavior*. Englewood Cliffs, NJ: Prentice-Hall.
- American Diabetes Association. (2010). Clinical practice recommendations 2010. *Diabetes Care*, *33*(Suppl. 1), S1-S100.
- Apanovitch, A. M., McCarthy, D., & Salovey, P. (2003). Using message framing to motivate HIV testing among low-income, ethnic minority women. *Health Psychology*, *22*, 60-67.
- Arora, R., Stoner, C., & Arora, A. (2006). Using framing and credibility to incorporate exercise and fitness in individuals' lifestyle. *Journal of Consumer Marketing*, *23*, 199-207.
- Astin, F., & Closs, S. J. (2007). Guest editorial: Chronic disease management and self-care support for people living with long-term complications: Is the nursing workforce prepared? *Journal of Clinical Nursing*, *16*(7b), 105-106.
- Banks, S. M., Salovey, P., Greener, S., Rothman, A. J., Moyer, A., Beauvais, J., . . . Epel, E. (1995). The effects of message framing on mammography utilization. *Health Psychology*, *14*, 178-184.

- Barlow, J., Wright, C., Sheasby, J., Turner, A., & Hainsworth, J. (2002). Self-management approaches for people with chronic conditions: A review. *Patient Education and Counseling, 48*, 177-187.
- Blanton, H., Stuart, A. E., & Vandenberg, R. J. J. M. (2001). An introduction to deviance-regulation theory: The effect of behavioral norms on message framing. *Personality and Social Psychology Bulletin, 27*, 848-858.
- Campbell, D. T., & Fiske, D. W. (1959). Convergent and discriminant validation by the multitrait-multimethod matrix. *Psychological Bulletin, 56*, 81-105.
- Canada, R. E., & Turner, B. J. (2007). Talking to patients about screening colonoscopy – Where conversations fall short. *Journal of Family Practice, 56*(8), E1-E9.
- Carver, C. S., Sutton, S. K., & Scheier, M. F. (2000). Action, emotion, and personality: Emerging conceptual integration. *Personality and Social Psychology Bulletin, 26*, 741-751.
- Carver, C. S., & White, T. L. (1994). Behavioral inhibition, behavioral activation, and affective responses to impending reward and punishment: The BIS/BAS scales. *Journal of Personality and Social Psychology, 67*, 319-333.
- Centers for Disease Control and Prevention. (2009a). *Chronic disease prevention and health promotion*. Retrieved June 13, 2010 from <http://www.cdc.gov/nccdphp/overview.htm>
- Centers for Disease Control and Prevention. (2009b). *Overweight and obesity*. Retrieved May 15, 2010 from <http://www.cdc.gov/obesity/defining.html>
- Centers for Disease Control and Prevention. (2010). *Behavioral risk factor surveillance system: Turning information into health*. Retrieved May 22, 2010 from <http://www.cdc.gov/brfss/index.htm>
- Cherubini, P., Rumiati, R., Rossi, D., Nigro, F., & Calabro, A. (2005). Improving attitudes toward prostate examinations by loss-framed appeals. *Journal of Applied Social Psychology, 35*, 732-744.
- Collins, S. (2005). Explanations in consultations: The combined effectiveness of doctors' and nurses' communication with patients. *Medical Education, 39*, 785-796.
- Coster, S., & Norman, I. (2009). Cochrane reviews of educational and self-management interventions to guide nursing practice: A review. *International Journal of Nursing Studies, 46*, 508-528.

- Detweiler, J. B., Bedell, B. T., Salovey, P., Pronin, E., & Rothman, A. J. (1999). Message framing and sunscreen use: Gain-framed messages motivate beach-goers. *Health Psychology, 18*, 189-196.
- Dillman, D. A., Smyth, J. D., & Christian, L. M. (2009). *Internet, mail, and mixed-mode surveys: The tailored design method* (3rd ed.). Hoboken, NJ: John Wiley & Sons.
- Fagley, N. S. (1993). A note concerning reflection effects versus framing effects. *Psychological Bulletin, 113*, 451-452.
- Ferguson, E., & Gallagher, L. (2007). Message framing with respect to decisions about vaccination: The roles of frame valence, frame method and perceived risk. *British Journal of Psychology, 98*, 667-680.
- Finney, L. J., & Iannotti, R. J. (2002). Message framing and mammography screening: A theory-driven intervention. *Behavioral Medicine, 28*, 5-14.
- Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention and behavior: An introduction to theory and research*. Reading, MA: Addison-Wesley.
- Fuglestad, P. T., Rothman, A. J., & Jeffery, R. W. (2008). Getting there and hanging on: The effect of regulatory focus on performance in smoking and weight loss interventions. *Health Psychology, 27*, S260-S270.
- Gerend, M. A., & Cullen, M. (2008). Effects of message framing and temporal context on college student drinking behavior. *Journal of Experimental Social Psychology, 44*, 1167-1173.
- Gerend, M. A., & Shepherd, J. E. (2007). Using message framing to promote acceptance of the human papillomavirus vaccine. *Health Psychology, 26*, 745-752.
- Gray, J. A. (1982). *The neuropsychology of anxiety: An enquiry into the functions of the septo-hippocampal system*. New York: Oxford University Press.
- Gray, J. A. (1990). Brain systems that mediate both emotion and cognition. *Cognition and Emotion, 4*, 269-288.
- Haaga, D. A. F., Friedman-Wheeler, D. G., McIntosh, E., & Ahrens, A. H. (2008). Assessment of individual differences in regulatory focus among cigarette smokers. *Journal of Psychopathology and Behavioral Assessment, 30*, 220-228.
- Higgins, E. T. (1997). Beyond pleasure and pain. *American Psychologist, 52*, 1280-1300.
- Higgins, E. T. (1998). Promotion and prevention: Regulatory focus as a motivational principle. In M. P. Zanna (Ed.), *Advances in experimental social psychology* (Vol. 30, pp. 1-46). New York: Academic Press.

- Higgins, E. T. (1999). Promotion and prevention as a motivation duality: Implications for evaluative processes. In S. Chaiken & Y. Trope (Eds.), *Dual process theories in social psychology*. New York: Guilford Press.
- Higgins, E. T. (2000). Making a good decision: Value from fit. *American Psychologist*, *55*, 1217-1230.
- Higgins, E. T., Friedman, R. S., Harlow, R. E., Idson, L. C., Ayduk, O. N., & Taylor, A. (2001). Achievement orientations from subjective histories of success: Promotion pride versus prevention pride. *European Journal of Social Psychology*, *31*, 3-23.
- Hochbaum, G. M. (1958). *Public participation in medical screening programs: A sociopsychological study* (PHS Publication No. 572). Washington, DC: Government Printing Office.
- Hsiao, E. T. (2003). *Using message framing to promote regular physical activity in college-age women and men* (Doctoral dissertation). Retrieved from ProQuest Dissertations and Theses database. (Publication No. AAT 3059265)
- Jenner, E. A., Jones, F., Fletcher, B. C., Miller, L., & Scott, G. M. (2005). Hand hygiene posters: Motivators or mixed messages? *Journal of Hospital Infection*, *60*, 218-225.
- Jones, L. W., Sinclair, R. C., & Courneya, K. S. (2003). The effects of source credibility and message framing on exercise intentions, behaviors, and attitudes: An integration of the elaboration likelihood model and prospect theory. *Journal of Applied Social Psychology*, *33*, 179-196.
- Jones, L. W., Sinclair, R. C., Rhodes, R. E., & Courneya, K. S. (2004). Promoting exercise behaviour: An integration of persuasion theories and the theory of planned behavior. *British Journal of Health Psychology*, *9*, 505-521.
- Kahneman, D., & Tversky, A. (1979). Prospect theory: An analysis of decision under risk. *Econometrica*, *47*, 263-291.
- Kahneman, D., & Tversky, A. (1984). Choice, values, and frames. *American Psychologist*, *39*, 341-350.
- Keeney, R. L., & Raiffa, H. (1976). *Decisions with multiple objectives: Preferences and value tradeoffs*. New York: Wiley.
- Kees, J. (2007). *Consideration of future consequences as a moderator of temporal framing and regulatory focus in a health domain* (Doctoral dissertation). Retrieved from ProQuest Dissertations and Theses database. (Publication No. AAT 3262980)

- Kim, Y. M., Heerey, M., & Kols, A. (2008). Factors that enable nurse-patient communication in a family planning context: A positive deviance study. *International Journal of Nursing Studies, 45*, 1411-1421.
- Kreuter, M. W., Bull, F. C., Clark, E. M., & Oswald, D. L. (1999). Understanding how people process health information: A comparison of tailored and nontailored weight-loss materials. *Health Psychology, 18*, 487-494.
- Kreuter, M. W., & Wray, R. J. (2003). Tailored and targeted health communication: Strategies for enhancing information relevance. *American Journal of Health Behavior, 27*(Suppl. 3), S227-S232.
- Kroll, E. (2005). *The effects of message framing and gender on physical exercise communications to high school students* (Doctoral dissertation). Retrieved from ProQuest Dissertations and Theses database. (Publication No. AAT 3161768)
- Kühberger, A. (1998). The influence of framing on risky decisions: A meta-analysis. *Organizational Behavior and Human Decision Processes, 75*, 23-55.
- Lalor, K. M., & Hailey, B. J. (1990). The effects of message framing and feelings of susceptibility to breast cancer on reported frequency of breast self-examination. *International Quarterly of Community Health Education, 10*, 183-192.
- Latimer, A. E., Brawley, L. R., & Bassett, R. L. (2010). A systematic review of three approaches for constructing physical activity messages: What messages work and what improvements are needed? *International Journal of Behavioral Nutrition and Physical Activity*. Advance online publication. doi:10.1186/1479-5868-7-36
- Latimer, A. E., Katulak, N. A., Mowad, L., & Salovey, P. (2005). Motivating cancer prevention and early detection behaviors using psychologically tailored messages. *Journal of Health Communication, 10*, 137-155.
- Latimer, A. E., Rench, T. A., Rivers, S. E., Katulak, N. A., Materese, S. A., Cadmus, L., . . . Salovey, P. (2008). Promoting participation in physical activity using framed messages: An application of prospect theory. *British Journal of Health Psychology, 13*, 659-681.
- Latimer, A. E., Rivers, S. E., Rench, T. A., Katulak, N. A., Hicks, A., Hodorowski, J. K., . . . Salovey, P. (2008). A field experiment testing the utility of regulatory fit messages for promoting physical activity. *Journal of Experimental Social Psychology, 44*, 826-832.
- Latimer, A. E., Salovey, P., & Rothman, A. J. (2007). The effectiveness of gain-framed messages for encouraging disease prevention behavior: Is all hope lost? *Journal of Health Communication, 12*, 645-649.

- Latimer, A. E., Williams-Piehota, P., Katulak, N. A., Cox, A., Mowad, L., Higgins, E. T., & Salovey, P. (2008). Promoting fruit and vegetable intake through messages tailored to individual differences in regulatory focus. *Annals of Behavioral Medicine, 35*, 363-369.
- Lauver, D., & Rubin, M. (1990). Message framing, dispositional optimism, and follow-up for abnormal Papanicolaou tests. *Research in Nursing & Health, 13*, 199-207.
- Lee, A. Y., & Aaker, J. L. (2004). Bringing the frame into focus: The influence of regulatory fit on processing fluency and persuasion. *Journal of Personality and Social Psychology, 86*, 205-218.
- Levin, I. P., Schneider, S. L., & Gaeth, G. J. (1998). All frames are not created equal: A typology and critical analysis of framing effects. *Organizational Behavior and Human Decision Processes, 76*(2), 149-188.
- Liberman, N., & Trope, Y. (1998). The role of feasibility and desirability considerations in near and distant future decisions: A test of temporal construal theory. *Journal of Personality and Social Psychology, 75*, 5-18.
- Lockwood, P., Jordan, C. H., & Kunda, Z. (2002). Motivation by positive or negative role models: Regulatory focus determines who will best inspire us. *Journal of Personality and Social Psychology, 83*, 854-864.
- Mann, T., Sherman, D., & Updegraff, J. (2004). Dispositional motivations and message framing: A test of the congruency hypothesis in college students. *Health Psychology, 23*, 330-334.
- Matarazzo, J. D. (1980). Behavioral health and behavioral medicine: Frontiers for a new health psychology. *American Psychologist, 35*, 807-817.
- Matarazzo, J. D. (1982). Behavioral health's challenge to academic, scientific, and professional psychology. *American Psychologist, 37*, 1-14.
- Maxwell, S. E., & Delaney, H. D. (1993). Bivariate median splits and spurious statistical significance. *Psychological Bulletin, 113*, 181-190.
- McCall, L. A., & Martin Ginis, K. A. (2004). The effects of message framing on exercise adherence and health beliefs among patients in a cardiac rehabilitation program. *Journal of Applied Biobehavioral Research, 9*, 122-135.
- McElroy, T., & Seta, J. J. (2003). Framing effects: An analytic-holistic perspective. *Journal of Experimental Social Psychology, 39*, 610-617.

- Meyerowitz, B. E., & Chaiken, S. (1987). The effect of message framing on breast self-examination attitudes, intentions, and behavior. *Journal of Personality and Social Psychology*, *52*, 500-510.
- Meyers-Levy, J., & Maheswaran, D. (2004). Exploring message framing outcomes when systematic, heuristic, or both types of processing occur. *Journal of Consumer Psychology*, *14*, 159-167.
- Moorman, M., & van den Putte, B. (2008). The influence of message framing, intention to quit smoking, and nicotine dependence on the persuasiveness of smoking cessation messages. *Addictive Behaviors*, *33*, 1267-1275.
- Myers, R. E. (2010). Promoting healthy behaviors: How do we get the message across? *International Journal of Nursing Studies*, *47*, 500-512.
- Myers, R. E., & Beckstead, J. W. (2009). *Health psychology and its applications to nursing research, education, and practice*. Unpublished manuscript, College of Nursing, University of South Florida, Tampa.
- National Cancer Institute. (1994). *Clear and simple: Developing effective print materials for low-literate readers* (NIH Publication No. 95-3594). Rockville, MD: U.S. Department of Health and Human Services.
- National Institute of Diabetes and Digestive and Kidney Diseases. (2008). *National diabetes statistics, 2007 fact sheet*. Retrieved from <http://diabetes.niddk.nih.gov/dm/pubs/statistics/index.htm>
- O'Connor, D. B., Ferguson, E., & O'Connor, R. C. (2005). Intentions to use hormonal male contraception: The role of message framing, attitudes and stress appraisals. *British Journal of Psychology*, *96*, 351-369.
- O'Connor, D. B., Warttig, S., Conner, M., & Lawton, R. (2009). Raising awareness of hypertension risk through a web-based framing intervention: Does consideration of future consequences make a difference? *Psychology, Health & Medicine*, *14*, 213-219.
- O'Keefe, D. J., & Jensen, J. D. (2006). The advantages of compliance or the disadvantages of noncompliance? A meta-analytic review of the relative persuasive effectiveness of gain-framed and loss-framed messages. *Communication Yearbook*, *30*, 1-43.
- O'Keefe, D. J., & Jensen, J. D. (2007). The relative persuasiveness of gain-framed loss-framed messages for encouraging disease prevention behaviors: A meta-analytic review. *Journal of Health Communication*, *12*, 623-644.

- Orbell, S., & Hagger, M. (2006). Temporal framing and the decision to take part in type 2 diabetes screening: Effects of individual differences in consideration of future consequences on persuasion. *Health Psychology, 25*, 537-548.
- Orbell, S., & Kyriakaki, M. (2008). Temporal framing and persuasion to adopt preventive health behavior: Moderating effects of individual differences in consideration of future consequences on sunscreen use. *Health Psychology, 27*, 770-779.
- Orbell, S., Perugini, M., & Rakow, T. (2004). Individual differences in sensitivity to health communications: Consideration of future consequences. *Health Psychology, 23*, 388-396.
- Pender, N. J. (1982). *Health promotion in nursing practice*. Norwalk, CT: Appleton-Century-Crofts.
- Petty, R. E., & Cacioppo, J. T. (1986). The elaboration likelihood model of persuasion. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (Vol. 19, pp. 123-205). New York: Academic Press.
- Rew, L., Fouladi, R. T., & Yockey, R. D. (2002). Sexual health practices of homeless youth. *Journal of Nursing Scholarship, 34*, 139-145.
- Rivers, S. E., Salovey, P., Pizarro, D. A., Pizarro, J., & Schneider, T. R. (2005). Message framing and Pap test utilization among women attending a community health clinic. *Journal of Health Psychology, 10*, 65-77.
- Robberson, M., & Rogers, R. W. (1988). Beyond fear appeals: Negative and positive persuasive appeals to health and self-esteem. *Journal of Applied Social Psychology, 18*, 277-287.
- Rodin, J., & Salovey, P. (1989). Health psychology. *Annual Review of Psychology, 40*, 533-579.
- Rogers, R. W. (1975). A protection motivation theory of fear appeals and attitude change. *Journal of Psychology, 91*, 93-114.
- Rosenstock, I. M. (1960). What research in motivation suggests for public health. *American Journal of Public Health, 50*, 295-302.
- Rothman, A. J., Bartels, R. D., Wlaschin, J., & Salovey, P. (2006). The strategic use of gain- and loss-framed messages to promote healthy behavior: How theory can inform practice. *Journal of Communication, 56*, S202-S220.

- Rothman, A. J., Martino, S. C., Bedell, B. T., Detweiler, J. B., & Salovey, P. (1999). The systematic influence of gain- and loss-framed messages on interest in and use of different types of health behavior. *Personality and Social Psychology Bulletin*, *25*, 1355-1369.
- Rothman, A. J., & Salovey, P. (1997). Shaping perceptions to motivate healthy behavior: The role of message framing. *Psychological Bulletin*, *121*, 3-19.
- Rothman, A. J., Salovey, P., Antone, C., Keough, K., & Martin, C. D. (1993). The influence of message framing on intentions to perform health behaviors. *Journal of Experimental Social Psychology*, *29*, 408-433.
- Rothman, A. J., Wlaschin, J. T., Bartels, R. D., Latimer, A., & Salovey, P. (2008). How persons and situations regulate message framing effects: The study of health behavior. In A. J. Elliot (Ed.), *Handbook of approach and avoidance motivation* (pp. 475-486). New York: Psychology Press.
- Russell, K. M., Champion, V. L., & Perkins, S. M. (2003). Development of cultural belief scales for mammography screening. *Oncology Nursing Forum*, *30*, 633-640.
- Russell, K. M., Perkins, S. M., Zollinger, T. W., & Champion, V. L. (2006). Sociocultural context of mammography screening use. *Oncology Nursing Forum*, *33*, 105-112.
- Sagristano, M. D., Trope, Y., & Liberman, N. (2002). Time-dependent gambling: Odds now, money later. *Journal of Experimental Psychology: General*, *131*, 364-376.
- Salovey, P. (2005). Promoting prevention and detection: Psychologically tailoring and framing messages about health. In R. Bibace, J. D. Laird, K. L. Noller, & J. Valsiner (Eds.), *Science and medicine in dialogue: Thinking through particulars and universals* (pp. 17-42). Westport, CT: Praeger.
- Sanders, S. A. (1986). Development of a tool to measure subjective time experience. *International Journal of Nursing Studies*, *35*, 178-182.
- Schillinger, D., Grumbach, K., Piette, J., Wang, F., Osmond, D., Daher, C., . . . Bindman, A. B. (2002). Association of health literacy with diabetes outcomes. *Journal of the American Medical Association*, *288*, 475-482.
- Sheeran, P. (2002). Intention-behavior relations: A conceptual and empirical review. *European Review of Social Psychology*, *12*, 1-36.
- Shen, L., & Bigsby, E. (2010). Behavioral activation/inhibition systems and emotions: A test of valence vs. action tendency hypotheses. *Communication Monographs*, *77*, 1-26.

- Shen, L., & Dillard, J. P. (2009). Message frames interact with motivational systems to determine depth of message processing. *Health Communication, 24*, 504-514.
- Sherman, D. K., Mann, T., & Updegraff, J. A. (2006). Approach/avoidance motivation, message framing, and health behavior: Understanding the congruency effect. *Motivation and Emotion, 30*, 165-169.
- Shin, Y. H., Hur, H. K., Pender, N. J., Jang, H. J., & Kim, M-S. (2006). Exercise self-efficacy, exercise benefits and barriers, and commitment to a plan for exercise among Korean women with osteoporosis and osteoarthritis. *International Journal of Nursing Studies, 43*, 3-10.
- Steffen, V. J., Sternberg, L., Teegarden, L. A., & Shepherd, K. (1994). Practice and persuasive frame: Effects on beliefs, intention, and performance of a cancer self-examination. *Journal of Applied Social Psychology, 24*, 897-925.
- Strathman, A., Gleicher, F., Boninger, D. S., & Edwards, C. S. (1994). The consideration of future consequences: Weighing immediate and distant outcomes of behavior. *Journal of Personality and Social Psychology, 66*, 742-752.
- Strumpf, N. E. (1987). Probing the temporal world of the elderly. *International Journal of Nursing Studies, 24*, 201-214.
- Summerville, A., & Roese, N. J. (2008). Self-report measures of individual differences in regulatory focus: A cautionary note. *Journal of Research in Personality, 42*, 247-254.
- Taylor, S. E. (2003). *Health psychology* (5th ed.). New York: McGraw-Hill.
- Toepoel, V. (2010). Is consideration of future consequences a changeable construct? *Personality and Individual Differences, 48*, 951-956.
- Toll, B. A., Salovey, P., O'Malley, S. S., Mazure, C. M., Latimer, A., & McKee, S. A. (2008). Message framing for smoking cessation: The interaction of risk perceptions and gender. *Nicotine & Tobacco Research, 10*, 195-200.
- Trope, Y., & Liberman, N. (2000). Temporal construal and time-dependent changes in preference. *Journal of Personality and Social Psychology, 79*, 876-889.
- Tversky, A., & Kahneman, D. (1981). The framing of decisions and the psychology of choice. *Science, 211*, 453-458.
- Tykocinski, O., Higgins, E. T., & Chaiken, S. (1994). Message framing, self-discrepancies, and yielding to persuasive messages: The motivational significance of psychological situations. *Personality and Social Psychology Bulletin, 20*, 107-115.

- Updegraff, J. A., Sherman, D. K., Luyster, F. S., & Mann, T. L. (2007). The effects of message quality and congruency on perceptions of tailored health communications. *Journal of Experimental Social Psychology, 43*, 249-257.
- U.S. Department of Health and Human Services. (1996). *Physical activity and health: A report of the Surgeon General*. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention (CDC), National Center for Chronic Disease Prevention and Health Promotion. Retrieved from <http://www.cdc.gov/nccdphp/sgr/sgr.htm>
- U.S. Department of Health and Human Services. (2000a). Diabetes. In *Healthy People 2010, Vol. 1*. Washington, DC: U.S. Government Printing Office. Retrieved from <http://www.healthypeople.gov/document/pdf/Volume1/05Diabetes.pdf>
- U.S. Department of Health and Human Services. (2000b). Health communication. In *Healthy People 2010, Vol. 1*. Washington, DC: U.S. Government Printing Office. Retrieved from <http://www.healthypeople.gov/document/pdf/Volume1/11HealthCom.pdf>
- U.S. Department of Health and Human Services. (2000c). Physical activity and fitness. In *Healthy People 2010, Vol. 2*. Washington, DC: U.S. Government Printing Office. Retrieved from <http://www.healthypeople.gov/document/pdf/Volume2/22Physical.pdf>
- U.S. Department of Health and Human Services. (2008). *2008 physical activity guidelines for Americans*. Retrieved from <http://www.health.gov/paguidelines>
- Uskul, A. K., Sherman, D. K., & Fitzgibbon, J. (2009). The cultural congruency effect: Culture, regulatory focus, and the effectiveness of gain- vs. loss-framed health messages. *Journal of Experimental Social Psychology, 45*, 535-541.
- van't Riet, J., Ruiter, R. A. C., Verrij, M. Q., & de Vries, H. (2010). *Health Education Research, 25*, 343-354.
- von Neumann, J., & Morgenstern, O. (1944). *Theory of games and economic behavior*. Princeton: Princeton University Press.
- Wilson, D. K., Purdon, S. E., & Wallston, K. A. (1988). Compliance to health recommendations: A theoretical overview of message framing. *Health Education Research, 3*(2), 161-171.
- Wolf, J. B. (2007). Is breast really best? Risk and total motherhood in the national breastfeeding awareness campaign. *Journal of Health Politics, Policy and Law, 32*, 595-636.

- World Health Organization. (2005a). *Preparing a health care workforce for the 21st century: The challenge of chronic conditions*. Geneva: Author.
- World Health Organization. (2005b). *Preventing chronic diseases: A vital investment*. Geneva: Author.
- Yi, S., & Baumgartner, H. (2009). Regulatory focus and message framing: A test of three accounts. *Motivation and Emotion*, 33, 435-443.
- Zimbardo, P. G., & Boyd, J. N. (1999). Putting time in perspective: A valid, reliable individual differences metric. *Journal of Personality and Social Psychology*, 77, 1271-1288.

Appendices

Appendix A: Gain-Framed/Distal-Framed Health Message



Physical Activity Can Improve Your Health in the Years to Come

Regular physical activity can make it easier to achieve good health in the future!!

Researchers have found that physical activities like golfing, walking, gardening, bicycling, dancing, swimming, and skiing are an important part of a healthy lifestyle for people with diabetes. For example, just 15 minutes of moderate walking can lower your blood sugar. Regular physical activity can also help you avoid expensive medical treatments by preventing problems such as heart disease, stroke, bone loss, and some cancers. Health care providers agree that most adults should do physical activity at least 30 minutes a day 5 or more days a week.*

By doing regular physical activity, you may gain these benefits in the years to come:

- Brighter mood and more positive attitude
- Greater self-esteem, pride, and confidence
- More energy, better sleep, better sex life, and less stress
- Increased burning of extra calories to help keep a healthy weight
- Improved blood pressure, blood cholesterol, and circulation
- Less need for diabetes medication due to better blood sugars
- Stronger bones, more strength, and increased flexibility and balance
- Reduced arthritis pain

*Always check with your health care provider before starting a physical activity to make sure it is safe for you.



Want to achieve good health in the future? . . . Be active!

Appendix B: Gain-Framed/Immediate-Framed Health Message



Physical Activity Can Improve Your Health Immediately

Regular physical activity can make it easier to achieve good health now!!

Researchers have found that physical activities like golfing, walking, gardening, bicycling, dancing, swimming, and skiing are an important part of a healthy lifestyle for people with diabetes. For example, just 15 minutes of moderate walking can lower your blood sugar. Regular physical activity can also help you avoid expensive medical treatments by preventing problems such as heart disease, stroke, bone loss, and some cancers. Health care providers agree that most adults should do physical activity at least 30 minutes a day 5 or more days a week.*

By doing regular physical activity, you may gain these benefits immediately (within 1–2 weeks):

- Brighter mood and more positive attitude
- Greater self-esteem, pride, and confidence
- More energy, better sleep, better sex life, and less stress
- Increased burning of extra calories to help keep a healthy weight
- Improved blood pressure, blood cholesterol, and circulation
- Less need for diabetes medication due to better blood sugars
- Stronger bones, more strength, and increased flexibility and balance
- Reduced arthritis pain

*Always check with your health care provider before starting a physical activity to make sure it is safe for you.



Want to achieve immediate good health? . . . Be active!

Appendix C: Loss-Framed/Distal-Framed Health Message



Lack of Physical Activity Can Jeopardize Your Health in the Years to Come

Lack of regular physical activity can make it harder to achieve good health in the future!!

Researchers have found that physical activities like golfing, walking, gardening, bicycling, dancing, swimming, and skiing are an important part of a healthy lifestyle for people with diabetes. For example, just 15 minutes of moderate walking can lower your blood sugar. Regular physical activity can also help you avoid expensive medical treatments by preventing problems such as heart disease, stroke, bone loss, and some cancers. Health care providers agree that most adults should do physical activity at least 30 minutes a day 5 or more days a week.*

By not doing regular physical activity, you may lose benefits in the years to come by:

- Missing out on a brighter mood and more positive attitude
- Missing out on greater self-esteem, pride, and confidence
- Missing out on more energy, better sleep, better sex life, and less stress
- Missing out on increased burning of extra calories to help keep a healthy weight
- Missing out on improved blood pressure, blood cholesterol, and circulation
- Missing out on less need for diabetes medication due to better blood sugars
- Missing out on stronger bones, more strength, and increased flexibility and balance
- Missing out on reduced arthritis pain

*Always check with your health care provider before starting a physical activity to make sure it is safe for you.



Want to miss out on good health in the future? . . . Don't be active!

Appendix D: Loss-Framed/Immediate-Framed Health Message



Lack of Physical Activity Can Jeopardize Your Health Immediately

Lack of regular physical activity can make it harder to achieve good health now!!

Researchers have found that physical activities like golfing, walking, gardening, bicycling, dancing, swimming, and skiing are an important part of a healthy lifestyle for people with diabetes. For example, just 15 minutes of moderate walking can lower your blood sugar. Regular physical activity can also help you avoid expensive medical treatments by preventing problems such as heart disease, stroke, bone loss, and some cancers. Health care providers agree that most adults should do physical activity at least 30 minutes a day 5 or more days a week.*

By not doing regular physical activity, you may lose benefits immediately (within 1-2 weeks) by:

- Missing out on a brighter mood and more positive attitude
- Missing out on greater self-esteem, pride, and confidence
- Missing out on more energy, better sleep, better sex life, and less stress
- Missing out on increased burning of extra calories to help keep a healthy weight
- Missing out on improved blood pressure, blood cholesterol, and circulation
- Missing out on less need for diabetes medication due to better blood sugars
- Missing out on stronger bones, more strength, and increased flexibility and balance
- Missing out on reduced arthritis pain

*Always check with your health care provider before starting a physical activity to make sure it is safe for you.



Want to miss out on immediate good health? . . . Don't be active!

Appendix E: Pilot Study Questionnaire

Please read each statement carefully and use the rating scale below to choose a numbered response that best describes your opinion. For example, if you strongly agreed with a particular statement you would indicate so by choosing the number +3. If you slightly disagreed with a particular statement you would indicate so by choosing the number -1. If you neither agree, nor disagree, with a particular statement you would indicate so by choosing the number 0.

-3	-2	-1	0	+1	+2	+3
	-----	-----	-----	-----	-----	
strongly disagree	disagree	slightly disagree	neither agree nor disagree	slightly agree	agree	strongly agree

Please write your responses in the blank spaces provided. Be sure to use *positive* numbers if you agree; use *negative* numbers if you disagree.

- ____ 1. The message was very believable.
- ____ 2. The message emphasized things that can happen in the future.
- ____ 3. The message emphasized things that can happen immediately.
- ____ 4. The message emphasized the benefits of being physically active.
- ____ 5. The message emphasized the risks of not being physically active.

For the following question, please write your answer on the blank lines provided. If you need more space, feel free to attach an additional page.

What are your thoughts about the graphics on the message you just read? (For example: Do they seem appropriate? Are they distracting?). Do you have any suggestions for changing the graphics? If yes, please describe those changes.

Appendix F: Consideration of Future Consequences Scale

For each of the statements below, please indicate whether or not the statement is characteristic of you. If the statement is extremely uncharacteristic of you (not at all like you) please write a “1” to the left of the question; if the statement is extremely characteristic of you (very much like you) please write a “5” next to the question. And, of course, use the numbers in the middle if you fall between the extremes. Please keep the following scale in mind as you rate each of the statements below.

1	2	3	4	5
extremely uncharacteristic	somewhat uncharacteristic	uncertain	somewhat characteristic	extremely characteristic

- ___ 1. I consider how things might be in the future, and try to influence those things with my day to day behavior.
- ___ 2. Often I engage in a particular behavior in order to achieve outcomes that may not result for many years.
- ___ 3. I only act to satisfy immediate concerns, figuring the future will take care of itself.
- ___ 4. My behavior is only influenced by the immediate (i.e., a matter of days or weeks) outcomes of my actions.
- ___ 5. My convenience is a big factor in the decisions I make or the actions I take.
- ___ 6. I am willing to sacrifice my immediate happiness or well-being in order to achieve future outcomes.
- ___ 7. I think it is important to take warnings about negative outcomes seriously even if the negative outcome will not occur for many years.
- ___ 8. I think it is more important to perform a behavior with important distant consequences than a behavior with less-important immediate consequences.
- ___ 9. I generally ignore warnings about possible future problems because I think the problems will be resolved before they reach crisis level.
- ___ 10. I think that sacrificing now is usually unnecessary since future outcomes can be dealt with at a later time.
- ___ 11. I only act to satisfy immediate concerns, figuring that I will take care of future problems that may occur at a later date.
- ___ 12. Since my day to day work has specific outcomes, it is more important to me than behavior that has distant outcomes.

Appendix G: BIS/BAS Scale

For each of the statements below, please indicate whether or not you agree with the statement. If you strongly agree with the statement please write a “1” to the left of the question; if you strongly disagree with the statement please write a “4” next to the question. And, of course, use the numbers in the middle if you fall between the extremes. Please keep the following scale in mind as you rate each of the statements below.

1	2	3	4
strongly agree	agree	disagree	strongly disagree

- ___1. If I think something unpleasant is going to happen I usually get pretty “worked up”.
- ___2. I worry about making mistakes.
- ___3. Criticism or scolding hurts me quite a bit.
- ___4. I feel pretty worried or upset when I think or know somebody is angry at me.
- ___5. Even if something bad is about to happen to me, I rarely experience fear or nervousness.
- ___6. I feel worried when I think I have done poorly at something.
- ___7. I have very few fears compared to my friends.
- ___8. When I get something I want, I feel excited and energized.
- ___9. When I’m doing well at something, I love to keep at it.
- ___10. When good things happen to me, it affects me strongly.
- ___11. It would excite me to win a contest.
- ___12. When I see an opportunity for something I like, I get excited right away.
- ___13. When I want something, I usually go all-out to get it.
- ___14. I go out of my way to get things I want.
- ___15. If I see a chance to get something I want, I move on it right away.
- ___16. When I go after something I use a “no holds barred” approach.
- ___17. I will often do things for no other reason than that they might be fun.
- ___18. I crave excitement and new sensations.
- ___19. I’m always willing to try something new if I think it will be fun.
- ___20. I often act on the spur of the moment.

Appendix H: Regulatory Focus Questionnaire Scale

This set of questions asks you about specific events in your life. Please indicate your answer to each question by circling the appropriate number below it.

1. Compared to most people, are you typically unable to get what you want out of life?

1	2	3	4	5
never or seldom		sometimes		very often

2. Growing up, would you ever “cross the line” by doing things that your parents would not tolerate?

1	2	3	4	5
never or seldom		sometimes		very often

3. How often have you accomplished things that got you “psyched” to work even harder?

1	2	3	4	5
never or seldom		a few times		many times

4. Did you get on your parents’ nerves often when you were growing up?

1	2	3	4	5
never or seldom		sometimes		very often

5. How often did you obey rules and regulations that were established by your parents?

1	2	3	4	5
never or seldom		sometimes		always

6. Growing up, did you ever act in ways that your parents thought were objectionable?

1	2	3	4	5
never or seldom		sometimes		very often

7. Do you often do well at different things that you try?

1	2	3	4	5
never or seldom		sometimes		very often

8. Not being careful enough has gotten me into trouble at times.

1	2	3	4	5
never or seldom		sometimes		very often

9. When it comes to achieving things that are important to me, I find that I don’t perform as well as I ideally would like to do.

1	2	3	4	5
never true		sometimes true		very often true

10. I feel like I have made progress toward being successful in my life.

1	2	3	4	5
certainly false				certainly true

11. I have found very few hobbies or activities in my life that capture my interest or motivate me to put effort into them.

1	2	3	4	5
certainly false				certainly true

Appendix I: Intentions and Evaluation of the Health Message

Please read each statement carefully and use the rating scale below to choose a numbered response that best describes your opinion. For example, if you strongly agreed with a particular statement you would indicate so by choosing the number +3. If you slightly disagreed with a particular statement you would indicate so by choosing the number -1. If you neither agree, nor disagree, with a particular statement you would indicate so by choosing the number 0.

-3	-2	-1	0	+1	+2	+3

strongly disagree	disagree	slightly disagree	neither agree nor disagree	slightly agree	agree	strongly agree

Please write your responses in the blank spaces provided. Be sure to use *positive* numbers if you agree; use *negative* numbers if you disagree.

___ 1. After reading the message, I have no intention of increasing the amount of my physical activity over the next 4 weeks.

___ 2. I am more likely to do physical activity more often over the next 4 weeks than I currently do based on the content in the message I just read.

___ 3. After reading the message, I am more likely to do more physical activity over the next 4 weeks than I currently do.

___ 4. I have no intention of increasing the amount of my physical activity over the next 4 weeks based on the content in the message I just read.

___ 5. After reading the message, I plan to do more physical activity over the next 4 weeks than I currently do.

___ 6. I am less likely to do physical activity more often over the next 4 weeks than I currently do based on the content in the message I just read.

___ 7. I plan to do physical activity more often over the next 4 weeks than I currently do based on the content in the message I just read.

___ 8. After reading the message, I am less likely to do more physical activity over the next 4 weeks than I currently do.

___ 9. The message was very believable.

___ 10. The message emphasized things that can happen in the future.

___ 11. The message emphasized things that can happen immediately.

___ 12. The message emphasized the benefits of being physically active.

___ 13. The message emphasized the risks of not being physically active.

Appendix J: Demographic and Other Variables

Below are some questions which are asked for background and descriptive purposes only. Please write or mark your answers to the following questions in the spaces provided.

1. Your Age: _____
2. Gender (*check one*)
male _____ female _____
3. Race/ethnicity (*check one*)
____ White/Caucasian
____ Black/African American
____ Hispanic/Chicano/Latino
____ Asian or Pacific Islander/Asian American
____ American Indian or Alaskan Native
____ Other (specify) _____
4. Number of years you have had type 2 diabetes: _____ years
5. Current amount of physical activity:
 - a. How many days a week do you usually do physical activity (walking, biking, golfing, gardening, etc.)? _____ days
 - b. How many minutes of physical activity do you usually do on each of these days?
_____ min.
6. How tall are you? _____ feet, _____ inches
7. How much do you weigh? _____ pounds

Appendix K: Pre-notice Letter (1st Mailing)

(Date)

Dear

Researchers at the University of South Florida (USF) study many topics. Among them, how best to design health care messages. To do this, we need the help of people who agree to take part in research.

A few days from now you will receive in the mail a packet that includes a health care message about physical activity and diabetes, along with a brief questionnaire. You are being asked to take part in this important study because you are an adult with type 2 diabetes who has visited Anthony Morrison, MD or Nancy Grove, ARNP at the USF Medical Clinic. This research is being conducted as part of my dissertation in the USF College of Nursing. Dr. Morrison and Ms. Grove are helping me with this study.

I am writing in advance because we have found many people like to know ahead of time that they will be receiving a questionnaire in the mail. The study is an important one that will help health care providers design useful education messages to encourage patients to do healthy behaviors like physical activity.

Thank you for your time and consideration. It is only with the generous help of people like you that our research can be successful.

Sincerely,

Rachel E. Myers, RN, MSN, CDE
USF College of Nursing

P.S. We will be enclosing a small token of appreciation with the questionnaire as a way of saying thank you in advance for your help.

Appendix L: Cover Letter for Initial Booklet (2nd Mailing)

(Date)

Dear

A few days ago, you should have received a letter inviting you to participate in a University of South Florida (USF) research study about physical activity and diabetes health care messages. We are asking you to take part in this study because you are an adult with type 2 diabetes who has visited Anthony Morrison, MD or Nancy Grove, ARNP at the USF Medical Clinic. This study will help health care providers find out the best way to design useful education messages to encourage patients to do healthy behaviors like physical activity. The enclosed packet contains a health care message and a brief questionnaire.

If you choose to participate in this study, please read the enclosed information, fill out the questionnaire, and mail it back to us in the self-addressed stamped envelope provided. It should take you about 20 minutes to complete the questionnaire, which contains three parts. PART 1 has a few questions about your background (your age, number of years you've had diabetes, etc.). In PART 2, you will read a message about physical activity and diabetes and then answer a few questions about the message. PART 3 contains questions about your thoughts, feelings, and actions. Your responses are very important to us. Please answer all questions, even if you have to guess. When you are finished, please mail the questionnaire back to us in the stamped envelope provided. This will end your part in the study.

There are no direct benefits to you for taking part in this study. There are no known risks to you should you choose to participate. Whether or not you participate in this study will in no way affect the care that the USF Medical Clinic provides to you.

The information you provide will be combined with responses from about 200 other volunteers. **Please DO NOT put your name anywhere on the questionnaire.** Your participation in this study is strictly voluntary and anonymous. If for some reason you prefer not to take part, please let us know by returning the blank questionnaire in the stamped envelope provided.

We have enclosed a small token of appreciation as a way of saying thank you in advance for your help. If you have any questions, concerns or complaints about this study, call Rachel Myers at _____. If you have questions about your rights as a participant in this study, general questions, or have complaints, concerns or issues you want to discuss with someone outside the research, call the Division of Research Integrity and Compliance of the USF at (813) 974-9343. Thank you very much for helping us with this important study.

Sincerely,

Rachel E. Myers, RN, MSN, CDE
USF College of Nursing

P.S. We ask that you return the questionnaire within 1 week so we can make sure your responses are included in our research.

Appendix M: Reminder/Thank You Postcard (3rd Mailing)

(Date)

A few days ago, you should have received an invitation from me to participate in a research study by reading a message about physical activity and completing a questionnaire. It was sent to you as part of a study to help health care providers design useful education messages to encourage patients to do healthy behaviors like physical activity.

If you have already returned the questionnaire, please accept my sincere thanks. If you have not yet completed and returned the questionnaire, please do so within one week so we can make sure your responses are included in our research.

Your participation is important to the success of our study. Thank you very much for volunteering to help us.

Sincerely,

Rachel E. Myers, RN, MSN, CDE
University of South Florida, College of Nursing

Appendix N: Cover Letter for Replacement Booklet (4th Mailing)

(Date)

Dear

About four weeks ago, I sent you information about participating in a research study. The information included a brief questionnaire. To the best of our knowledge, the questionnaire has not yet been returned. We think the results of this study are going to be very useful to health care providers who design education messages to encourage patients to do healthy behaviors like physical activity.

We are writing again because of the importance that your responses have for helping us get accurate results. Although we sent questionnaires to a lot of people with type 2 diabetes, it's only by hearing from nearly everyone in the sample that we can be sure the results are truly representative.

We hope that you will volunteer to fill out and return the questionnaire soon, but if for any reason you prefer not to take part in this study, please let us know by returning a note or blank questionnaire in the enclosed stamped envelope.

Sincerely,

Rachel E. Myers, RN, MSN, CDE
USF College of Nursing

P.S. If you have any questions, please feel free to contact me. The number where I can be reached is _____.

About the Author

Rachel E. Myers received a Bachelor of Science in Nursing degree from Florida State University, Tallahassee, Florida in 1990 and a Master of Science in Nursing degree from George Mason University, Fairfax, Virginia in 1999. She also received a Nursing Education post-graduate certificate from George Mason University in 2000. She has been a Certified Diabetes Educator since 1993. She has worked as a patient and staff educator and a clinical staff nurse in medical-surgical, diabetes, women's health, and mental health settings. In addition, she has held several leadership positions such as Director of Nursing and Director of Performance Improvement and Research. She has been a nursing consultant since 2001 in facilities for individuals with intellectual disabilities and mental illness. She was the recipient of a Tampa Bay Organization of Nurse Executives scholarship in 2008. After receiving her Ph.D., Dr. Myers continued her work as a consultant and obtained a nursing faculty position.