HEALTH MESSAGE FRAMING: MOTIVATING CARDIOVASCULAR RISK FACTOR SCREENING IN YOUNG ADULTS

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Dissertation Prepared for the Degree of

DOCTOR OF PHILOSOPHY

UNIVERSITY OF NORTH TEXAS

August 2008

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Link-Malcolm, Jessica. Health message framing: Motivating cardiovascular risk factor screening in young adults. Doctor of Philosophy (Health Psychology and Behavioral Medicine), August 2008, 82 pp., 9 tables, references, 52 titles.

As the leading cause of death in the United States, coronary heart disease (CHD) is a growing public health problem, despite the fact that many risk factors for the disease are preventable, especially if addressed early in life. The purpose of the current study was to examine the effects of loss-framed versus gain-framed versus information-only health messages on both intention to attend and actual attendance at an appointment to get screened for CHD risk factors (i.e., hypertension, diabetes, and dyslipidemia). It was hypothesized that a population of young adults would be more likely to view screening for CHD risk factors as a low-risk, health-affirming behavior as opposed to a risky, illness-detecting behavior and would thus be more strongly influenced by gain-framed messages than loss-framed messages. Additional goals included the exploration of the extensively researched individual health beliefs of perceived threat (as defined by the health belief model) and health locus of control as they relate to message frames.

One hundred forty-three undergraduate students were randomly assigned to either the loss-framed, gain-framed, or information-only control conditions. Framing manipulation checks revealed that participants failed to discern differences in the tone and emphasis of the experimental pamphlets. As a result, no tests of framing effects could be conducted. Sixteen (11.2%) of the 143 participants who participated in Part 1 of the experiment participated in Part 2 (i.e., attended a risk factor screening appointment). Multiple regression analysis revealed risk index, age, and powerful others health locus of control as significant predictors of screening intention. Gender was the only demographic or health related variable that was significantly related to screening outcome, such that women were more likely to get screened than men. Limitations and recommendations are discussed.

ACKNOWLEDGEMENTS

I could not have completed this long journey without the support and encouragement of my faculty advisor and dissertation chair, Dr. Kim Kelly, and my dear husband and partner in life, Carl. My deepest gratitude for never letting me say, “when.”

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INTRODUCTION

According to the American Heart Association (AHA, 2005), coronary heart disease (CHD) is the single greatest cause of death for both men and women in the United States, with one death occurring approximately every minute. This adds up to over half a million Americans each year. Currently, 13 million Americans are living with CHD, at an estimated annual economic cost of $142.1 billion, including the indirect costs of lost productivity (AHA). Although a few of the risk factors for CHD are non-modifiable, the majority of the major risk factors, including hypertension, overweight/obesity, high blood cholesterol, diabetes mellitus, smoking, and physical inactivity, are at least modifiable and often preventable (National Heart, Lung, and Blood Institute [NHLBI], 2003).

Of growing concern is the increasing prevalence of these modifiable conditions in individuals prior to adulthood. For example, recent research utilizing data from the National Health and Nutrition Examination Surveys (NHANES) has demonstrated an increase in blood pressure (Muntner, He, Cutler, Wildman, & Whelton, 2004), as well as an increase in the prevalence of excessive weight (Ogden, Flegal, Carroll, & Johnson, 2002) in children and adolescents over the past decade. Addressing the increasing prevalence of Type 2 diabetes in children and adolescents, once a rarity in people less than 40 years of age, the America Diabetes Association (ADA, 2000) cautioned, “If this increase cannot be reversed, our society will face major challenges. That is, the burden of diabetes and its complications will affect many more individuals than currently anticipated” (p. 381).

Coronary heart disease and its risk factors are generally not salient concerns of adolescents and young adults. There exists a common misperception that the physiological

processes and risk factors that contribute to CHD only occur in the aged and/or are inevitable consequences of the aging process. These misperceptions are understandable when one takes into account that risk factors such as hypertension and lipid disorders are asymptomatic, and atherosclerosis usually does not cause symptoms until an artery is severely narrowed or blocked. This makes it possible for these conditions to progress unnoticed for decades. The overt clinical manifestations of CHD (i.e., chest pain and shortness of breath) usually do not occur until later in life, and for some, an actual heart attack is the first observable sign of heart disease (NHLBI, 2003). However, longitudinal research has clearly demonstrated that the personal behaviors and resultant physiological processes that contribute to the development of CHD often begin in childhood, even as early as 5 to 8 years of age (Tulane Center for Cardiovascular Health, n. d.).

Public health campaigns attempt to raise awareness of risk factors for so-called lifestyle diseases such as CHD in an effort to increase prevention practices, and screening can be a useful first step toward effective prevention. Because of the young ages at which CHD risk factors begin to develop, it is important to target these prevention efforts at young people. Young adults are at an age where they either already are or are becoming solely responsible for their own health and health-care decisions. Therefore, an important question for researchers is, "How can we persuade young adults to engage in screening for CHD risk-factors while they are at an optimal age to take steps to prevent long-term physiological damage from these risk-factors?"

Coronary Heart Disease Risk Factors

It is well established that the presence of certain risk factors increases the likelihood that a person will develop CHD. The known risk factors for CHD include the non-modifiable risk factors of age (i.e., $\geq$ 45 years for men and $\geq$ 55 years for women) and family history of early

CHD (i.e., immediate male relative diagnosed before age 55 or immediate female relative diagnosed before age 65). The modifiable and/or preventable risk factors include hypertension, overweight and obesity, high blood cholesterol, diabetes mellitus, smoking, and physical inactivity (NHLBI, 2003). According to the NHLBI (2003) publication Facts about Coronary Heart Disease, "Risk factors do not add their effects in a simple way. Rather, they multiply each other's effects. Generally, each risk factor alone doubles a person's chance of developing CHD" (p. 1).

The modifiable risk factors of CHD all have a strong behavioral component, although they differ in saliency. Two of the risk factors are actual behaviors (i.e., smoking and physical inactivity), and therefore their presence or absence is readily observable. The risk factor of excess weight, although not a behavior, is nonetheless easily determined. Alternatively, it is necessary to engage in screening in order to establish the presence of hypertension, diabetes, and dyslipidemia, which one could argue makes these risk factors less salient and therefore even easier to ignore.

Hypertension

High blood pressure, or hypertension, is known as the "silent killer." Of the 70 million Americans who have at least one form of cardiovascular disease, 65 million (i.e., 1 in 3 adults) have high blood pressure (AHA, 2005). Hypertension is defined as having a systolic blood pressure (SBP) equal to or greater than 140 mm Hg, or a diastolic blood pressure (DBP) equal to or greater then 90 mm Hg (NHLBI, 2004). An estimated 16.9% of men and women between the ages of 20 and 34 have hypertension, and in the population of 18 to 39-year-olds with hypertension, only 51.8% are even aware that they have it (AHA, 2005). In 2003, the U.S.

Preventive Service Task Force (USPSTF) issued a strong recommendation that clinicians screen adults aged 18 and older for hypertension.

The Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC-7) introduced a new category of hypertension called "prehypertension" (NHLBI, 2004). Prehypertension refers to SBP between 120 and 139, or DBP between 80 and 89. Approximately 59 million American adults age 18 and older have prehypertension (AHA, 2005).

> Because of the new data on lifetime risk of hypertension and the impressive increase in the risk of cardiovascular complications associated with levels of BP previously considered to be normal, the JNC-7 report has introduced a new classification that includes the term "prehypertension"…. This new designation is intended to identify those individuals in whom early intervention by adoption of healthy lifestyles could reduce BP, decrease the rate of progression of BP to hypertensive levels with age, or prevent hypertension entirely. (NHLBI, 2004, p. 11)

Diabetes

Diabetes mellitus is a chronic disease characterized by high blood glucose (i.e., hyperglycemia). The most common cause of death in adults with diabetes is heart disease (Centers for Disease Control and Prevention [CDC], 2004), and the Adult Treatment Panel III (ATP III) of the National Cholesterol Education Program (NCEP) has designated diabetes as a CHD risk-factor equivalent (NHLBI, 2001). Type II diabetes (formerly known as adult-onset diabetes) has been estimated to account for 90% to 95% of diagnosed cases of diabetes in the U.S. (CDC, 2004). The total number of diagnosed cases of diabetes in the US is 14 million, while the number of cases of undiagnosed diabetes is estimated to be 6 million (AHA, 2005). An additional 14.5 million people have a condition referred to as prediabetes (AHA), which puts

them at an increased risk of developing Type II diabetes, as well as heart disease and stroke (CDC, 2004).

Diabetes is defined as having fasting plasma glucose (FPG) levels of 126 milligrams per deciliter (mg/dL) or greater, and/or plasma glucose levels of 200 mg/dL or greater following a 2-hour oral glucose tolerance test (National Institute of Diabetes and Digestive and Kidney Diseases [NIDDK], n. d.). Prediabetes is defined as having fasting plasma glucose (FPG) levels between 100 and 125 milligrams per deciliter (mg/dL), and/or plasma glucose levels of 140 to 199 mg/dL following a 2-hour oral glucose tolerance test (NIDDK).

According to the American Diabetes Association and the NIDDK (2002), "Our knowledge of the early stages of hyperglycemia that portend the diagnosis of diabetes, and the recent success of major intervention trials, clearly show that individuals at high risk can be identified and diabetes delayed, if not prevented" (pp. 743-744). The need for early identification and treatment is clear, "By the time patients manifest overt Type 2 diabetes mellitus, 50% will have some form of macrovascular or microvascular disease" (Scott, 2003, p. 37i).

Cholesterol

Cholesterol is a waxy, fat-like substance found in the blood stream and the body's cells. Although a normal and necessary part of the body, higher then normal levels negatively impact health when cholesterol builds up on the artery walls, eventually causing atherosclerosis. Based on data from 2001-2004, approximately 17% of men and women in the U.S. between the ages of 20 and 74 have high blood cholesterol, defined as serum total cholesterol equal to or greater than 240 mg/dL (National Center for Health Statistics [NCHS], 2007). Specifically in the 20- to 34-

year-old age group, approximately 9% had high total cholesterol, with a mean of 186 mg/dL (NCHS).

The ATP III recommends that all adults aged 20 or older obtain a complete fasting lipoprotein profile (i.e., total cholesterol, low density lipoprotein [LDL], high density lipoprotein [HDL], and triglycerides) once every five years (NHLBI, 2001). The NHLBI (2001) identifies LDL as the primary target of intervention and individual target levels depend upon the number of other risk factors present (i.e., smoking, hypertension, HDL < 40 mg/dL, family history of premature CHD, and age). In general, LDL goal is < 160 mg/dL for persons with 0-1 risk factors, < 130 mg/dL for persons with two or more risk factors, and < 100 mg/dL in persons with CHD or CHD equivalents, such as diabetes.

Total cholesterol, HDL cholesterol and triglycerides are additional targets of intervention. Although total cholesterol is considered high at levels of 240 mg/dL and above, "desirable" levels are below 200 mg/dL. In terms of "good" cholesterol, an HDL level greater than 60 mg/dL is considered a *negative* risk factor for CHD, meaning its presence is protective against CHD and in effect cancels out one risk factor (NHLBI, 2001). Alternatively, low HDL cholesterol (i.e., < 40) is itself an independent risk factor for CHD. Along with the various forms of cholesterol, triglycerides are also a plasma lipid. Serum triglyceride levels at or below 150 mg/dL are considered normal (NHLBI, 2001).

According to the NHLBI (1995), "Cholesterol screening in young adults may be particularly valuable in making them aware of the need to modify life habits early in life to delay development of CHD for as long as possible in later life" (p. 1).

> Even though clinical CHD is relatively rare in young adults, coronary atherosclerosis in its early stages may progress rapidly. The rate of development of coronary atherosclerosis earlier in life correlates with the major risk factors. In particular, long-term prospective studies reveal that elevated serum cholesterol detected in young adulthood predicts a

> higher rate of premature CHD in middle age. Thus, risk factor identification in young adults is an important aim for long term prevention. (NHLBI, 2001, p. 21)

Recommendations for Prevention

Three of the common behavioral recommendations for preventing and managing CHD are also recommended for preventing and managing numerous other diseases and health conditions, including hypertension, diabetes, and dyslipidemia (NHLBI, 2003). These recommended lifestyle changes are (a) achieving and maintaining a healthy weight, (b) following a healthy eating plan, and (c) getting at least 30 minutes of moderate exercise most days of the week (NHLBI, 2003).

Given the seriousness and increasing prevalence of CHD and its risk factors (AHA, 2005), it has become increasingly important to develop effective public health interventions that can influence prevention. For example, interventions that effectively promote preventive screening for CHD risk factors or "pre" risk factors could help motivate positive behavior change by increasing awareness of the issue and possibly highlighting the need for change. As stated by Rothman and Salovey (2006), "Although research has shown consistently that information alone is not enough to promote changes in behavior, awareness of a health issue is a critical first step in the behavior change process" (p. 827). Interventions to promote screening behaviors should be based on sound research and theory such as the research on health message framing, which examines how different ways of presenting persuasive health information can influence health intentions and behaviors.

Prospect Theory

Over the past 20 years researchers primarily in the fields of psychology (e.g., Meyerowitz

& Chaiken, 1987; Rothman et al., 1999) and marketing (e.g., Block & Keller, 1995; Maheswaran & Meyers-Levy, 1990) have examined the role of health message framing on health intentions and behaviors, frequently within the framework of prospect theory (Tversky & Kahneman, 1981). As a descriptive theory of decision-making, prospect theory attempts to explain decision-making processes when outcomes involve risks but choices deviate from the expected rational choice (Tversky & Kahneman).

According to prospect theory, decision outcomes are perceived in terms of gains and losses from a certain psychological reference point, and decision-makers can be expected to respond more strongly to losses than to gains of the same magnitude. Tversky and Kahneman found the common pattern across their research that "choices involving gains are often risk averse and choices involving losses are often risk taking" (p. 453). They defined decision preferences as "risk averse" when a certain gain is chosen over a gamble with an equal or more positive outcome, while preferences are "risk seeking" when a certain loss is foregone in lieu of a gamble with an equal or more negative outcome (Kahneman and Tversky, 1984).

Tversky and Kahneman (1981) demonstrated this assertion of prospect theory with their "unusual Asian disease" study. Two separate groups of respondents were told that the disease was expected to kill 600 people. When the outcome options of a program to combat the disease were described in terms of number of lives saved (i.e., gain-framed), 72% of that group of respondents were risk averse (i.e., they preferred the option of saving 200 lives for certain over the option with a 1/3 chance that 600 lives would be saved and a 2/3 chance that no lives would be saved). Alternatively, when the outcome options were presented in terms of the number of people who would die (i.e., loss-framed), 78% of that group of respondents were risk seeking

(i.e., they preferred the option with a 1/3 chance that no one would die and a 2/3 chance that 600 people would die to the option that 400 people would die for certain).

The above study illustrates the framing postulate of prospect theory, which states that when people are presented with equivalent information, they tend to be risk averse when considering options that are framed in terms of gains, while they tend to be risk seeking when considering options framed in terms of losses (Tversky & Kahneman, 1981). Prospect theory has been applied to research on health behaviors, where its framing postulate has proven useful in guiding health message framing.

Health Message Framing

In their seminal review article on the role of message framing in motivating various health behaviors, Rothman and Salovey (1997) apply the basic assumptions of prospect theory to predict when gain-framed or loss-framed health appeals should be most effective. Because people tend to avoid risks when presented gain-framed options, gain-framed messages should be more effective in promoting health behaviors that are viewed as involving little risk. Alternatively, because people tend to be tolerant of risks when presented loss-framed options, loss-framed messages should be more effective in promoting behaviors that are viewed as being risky (Devos-Comby & Salovey, 2002; Rothman & Salovey, 1997).

According to Rothman and Salovey (1997), the function (i.e., detection or prevention) of a particular health-relevant behavior can influence the perceived riskiness of the behavior. Detection behaviors are generally considered riskier than prevention behaviors because an individual risks finding out negative information about his or her health status. Thus, in terms of prospect theory, one would expect people to be more likely to engage in a detection behavior

(i.e., be risk-seeking) when the potential of disease identification (i.e., a negative or loss) is emphasized, while one would expect people to be more likely to engage in a prevention behavior when the potential of maintaining good health (i.e., a positive or gain) is emphasized (Rothman & Salovey, 1997). As described below, research in this area has shown that the effectiveness of a loss-framed vs. gain-framed health appeal is often contingent on the type of behavior promoted (i.e., detection or prevention).

Detection Behaviors

The literature on message framing and health behaviors reveals rather robust findings in terms of detection behaviors. Loss-framed messages, which focus on the costs (i.e., attaining undesirable and/or missing out on desirable outcomes) of not performing a recommended behavior, have repeatedly been shown as more effective than gain-framed messages in promoting a variety of detection intentions and behaviors. Meyerowitz and Chaiken (1987) were the first researchers to publish a study using the framing postulate of prospect theory to guide the formation of persuasive health messages and to predict subsequent health behaviors. They found that loss-framed messages were more effective than gain-framed in promoting performance of breast self-exam (BSE; Meyerowitz & Chaiken), as did Williams, Clarke, and Borland (2001).

In addition to BSE, studies involving various other cancer-screening behaviors and intentions have shown an advantage for loss-framed messages over gain-framed. Banks et al. (1995) demonstrated the superiority of a loss-framed video to promote mammography screening. At a six-month follow-up, Schneider et al. (2001) replicated the findings of Banks et al., but this time in an underserved population. Rivers, Salovey, Pizarro, Pizzaro, and Schneider (2005) demonstrated superiority of a video promoting Pap screening when the behavior was described

as a detection behavior, and paired with a loss-framed message. A significant loss-frame advantage has also been reported in studies persuading intention to engage in skin cancer screening behaviors (e.g., Block & Keller, 1995, Experiment 2; Rothman, Salovey, Antone, Keough & Martin, 1993, Experiment 1).

While much of the message framing research on detection behaviors reports on cancer screening behaviors, other research supporting the loss-frame-with-detection advantage involves such diverse behaviors as testing for HIV antibodies (Kalichman & Coley, 1995), intention to get a cholesterol test (Maheswaran & Meyers-Levy, 1990), intention to purchase a plaque-disclosing rinse, as well as requesting a free sample of the rinse (Rothman, Martino, Bedell, Detweiler & Salovey, 1999, Experiment 2), and intention to be tested for a factitious virus (Rothman et al., 1999, Experiment 1).

Although the findings overall are rather robust, not all detection research outcomes support the loss-framed-with-detection trend. Finney and Iannotti (2002) found that a negatively framed letter reminding women to return for annual mammography screening was only marginally superior to a positively framed letter at the 1-month endpoint, and not statistically different at the 2-month endpoint. Likewise, no framing effects were found for messages promoting follow-up for an abnormal Pap test (Lauver & Rubin, 1990). Also contrary to expectation, Apanovitch, McCarthy, and Salovey (2003) demonstrated that gain-framed and not loss-framed messages were more influential in promoting HIV testing, but only in those women who were certain of the outcome of the test.

Prevention Behaviors

Gain-framed messages, which focus on the benefits (i.e., attaining desirable and/or

avoiding undesirable outcomes) of performing a recommended health behavior, appear more effective in promoting prevention behaviors and intentions, such as obtaining a Pap test (Rivers et al., 2005), continuous abstinence from smoking (Toll et al., 2007), and intention to purchase a plaque-preventing rinse, as well as requesting a free sample of the rinse (Rothman et al., 1999, Experiment 2).

A couple of studies have revealed a gain-frame advantage in promoting skin cancer prevention behaviors (Detweiler, Bedell, Salovey, Pronin, & Rothman, 1999; Rothman et al., 1993, Experiment 2). Detweiler et al. (1999) reported that 71% of beachgoers in a gain-framed condition redeemed a coupon for free sunscreen, while only 53% of beachgoers in a loss-framed condition did so. Similarly, Rothman et al. (1993) demonstrated a gain-framed advantage for pamphlets promoting the use of sunscreen with a recommended SPF. Seventy-one percent of participants in the gain-framed condition requested an SPF of 15, while only 46% of those in the loss-framed condition did so (Rothman et al., 1993, Experiment 2).

Contrary to expectation, McCaul, Johnson, and Rothman (2002) found that a gain-framed letter reminding elderly people to get a flu shot was no more effective than a loss-framed letter or un-framed reminder. In another study, gain and loss-framed messages did not differ in their ability to promote skin cancer prevention strategies (Block & Keller, 1995, Experiment 2).

Perceived Function and Risk

Rothman et al. (1999, Experiment 2) helped to clarify some of the inconsistencies in the literature and took health message framing research a step further by devising an experiment in which they manipulated not only the message frame (i.e., loss vs. gain), but the *function* (i.e., detection vs. prevention) and therefore riskiness of the recommended health behavior as well. In

this study, the recommended behavior was using a mouth rinse, which was described as either plaque-detecting or plaque-preventing. As expected, results indicated that gain-framed pamphlets were more effective in promoting the plaque-preventing rinse, whereas the loss-framed pamphlets were more effective in promoting the plaque-detecting rinse.

Rivers et al. (2005) applied a similar study design in a field setting in order to test its utility in promoting Pap test utilization in primarily ethnic minority, lower income women. According to Rivers et al.:

> Depending on which features of the Pap test one chooses to focus, the procedure may be perceived either as preventing the possibility of developing cervical cancer or as detecting the presence of abnormal cells…. Drawing attention to one function of the Pap test while framing the behavior using an appropriately matched message (i.e. loss-framing a detection behavior or gain-framing a prevention behavior) may be especially effective in persuading women to obtain a Pap test. (pp. 66-67)

The pattern of loss-framed-with-detection and gain-framed-with-prevention was once again observed. Odds ratios indicated that women in the detection condition were 2.00 times more likely to get a Pap test when they received a loss-framed message than when they received a gain-framed message. Likewise, women in the prevention condition were 1.14 times more likely to get a Pap test when the message was gain-framed as opposed to loss-framed (Rivers et al.).

These results support the assertion of Rothman and Salovey (1997) that what is important when employing message framing to persuade a health behavior is the *perceived function* (i.e. illness-detecting or health-affirming/health-maintaining), and therefore *perceived risk*, of a recommended health behavior, and not necessarily the behavior itself. The authors (Rivers et al., 2005; Rothman et al., 1999) also demonstrated that the same health behavior could be differentially perceived as either a detection behavior or a prevention behavior depending upon how it was presented. This line of research helps to explain the findings in the Apanovitch et al. (2003) study, in which women in the gain-framed condition were more likely to get tested for

HIV, but only if they were certain of the outcome of the test. These were women who, due to prior behavior, did not expect to test positive, and therefore did not consider the test a risky, but rather health-affirming behavior. As such, they were more influenced by the gain-framed messages (Apanovitch et al.).

As in any communication context, it is important to acknowledge both sides of the message-framing scenario: the giver (message-framer) and the receiver (decision-maker). Whereas a *message* frame reflects the perspective of the person wishing to exert influence over another's decision, a *decision* frame refers to the decision-maker's perspective and is partly due to the individual characteristics of the decision-maker (Tversky & Kahneman, 1981). Goals of the present study include the evaluation of the individual characteristics of perceived threat and health locus of control in the context of health message-framing.

Health Belief Model

The health belief model (HBM; Rosenstock, 1974) is one of several social cognition models, which assert that behavior is best understood in terms of the individual's perception of the social environment, and which have been used to explain and predict health behaviors (Sheeran & Abraham, 1996). The HBM (Janz & Becker, 1984; Sheeran & Abraham) proposes four core variables in response to a health threat in an individual's environment: a) perceived susceptibility to the health threat, b) perceived severity of the consequences of the health threat, c) perceived benefits of performing a behavior to counteract the threat, and d) perceived barriers to or costs of performing the recommended behavior. According to the HBM, socio-demographic and personality characteristics influence perceived threat and behavioral expectations, which influence behavior. Additional components of the model include health motivation, as well as

cues to action, which trigger behavior (Sheeran & Abraham).

Perceived susceptibility and perceived severity comprise the threat component of the HBM. Perceived susceptibility has been defined as the subjective perception of risk of contracting or developing a specific health condition, as well as general susceptibility to illness (Rosenstock, Strecher, & Becker, 1994). In contrast, perceived severity refers to personal beliefs concerning the seriousness of a health threat. For example, perceived susceptibility could be established by asking oneself, "How likely am I to acquire X?", while perceived severity would be established by asking oneself, "How bad would it be if I did acquire X?"

The HBM provides a framework for understanding the role of risk perception in health behavior. Perceived risk has been examined in much of the message framing research; however, it has not emerged as a mediator of framing effects (Apanovitch et al., 2003; Banks et al., 1995; Meyerowitz & Chaiken, 1987; Rothman et al., 1999, Experiment 2; Schneider et al., 2001). While a couple of studies have found no effect on perceived risk across framing condition (Block & Keller, 1995, Experiment 2; Rothman et al., 1993, Experiment 1), others reported higher perceptions of self-risk in participants in negative framing conditions (Rothman et al., 1993, Experiment 2; Rothman et al., 1999, Experiment 2). In addition, Rothman et al. (1999, Experiment 1) reported a positive correlation between perceived risk and behavioral intention. The inconsistent findings regarding the role of perceived risk warrant further exploration.

One notable problem within the message-framing research that has explored perceived risk is the lack of consistency in the way perceived risk is defined, and therefore measured. Some studies have defined perceived risk in a manner consistent with the HBM (i.e., in terms of susceptibility to, or likeliness of, developing a health condition). For example, Rothman et al., (1993, Experiment 1) measured perceived risk by inquiring about likelihood of developing skin

cancer. Likewise, other studies have defined perceived risk strictly in terms of susceptibility (Block & Keller, 1995, Experiment 2; Detweiler et al., 1999; Meyerowitz & Chaiken, 1987; Rothman et al., 1999, Experiment 1; Schneider et al., 2001). These studies often include separate items that measure severity.

In contrast, other studies have defined perceived risk in terms of a combination of what are essentially susceptibility and severity items (although they are not labeled as such). For example, Banks et al. (1995) created a "risk probability index" for breast cancer by averaging answers to questions about developing and dying from breast cancer. Rothman et al. (1993, Experiment 2) also combined measures of susceptibility and severity to measure risk, inquiring about likelihood of experiencing or dying from skin cancer.

Whether combining susceptibility and severity items to create a single index labeled perceived risk, using perceived risk as an umbrella term under which susceptibility and severity items are separately evaluated, or simply referring to susceptibility as perceived risk, inconsistency in the terminology used makes it difficult to compare effects across studies. In the current study, an attempt is made to avoid confusion by employing classic HBM definitions, defining *perceived risk* in terms of susceptibility, while the combination of susceptibility and severity items is referred to as *perceived threat*.

For the current study susceptibility is operationalized as perceived likelihood of acquiring CHD and worry about acquiring CHD, while severity is operationalized as perceived seriousness of developing CHD. Although the benefit component of the HBM is not specifically explored in this study, it is broadly conceived of as reasons for obtaining CHD risk-factor screening, while barriers are defined as reasons for not taking advantage of CHD risk-factor screening. Identified cues to action are the health information pamphlets and gain-framed or loss-framed messages

regarding CHD risk-factor screening, as well as information on how to receive a free screening for CHD risk factors.

Health Locus of Control

Another frequently evaluated construct in health behavior research is health locus of control (HLC). The concept of locus of control originated from Rotter's (1954) social learning theory, which describes the likelihood of occurrence of a behavior as a function of the expectancy of reinforcement and the value of reinforcement. HLC refers to a generalized expectancy regarding the relationship between one's behaviors and health outcomes. The concept of HLC is most frequently evaluated using the Multidimensional Health Locus of Control scale (Wallston, Wallston, & DeVellis, 1978), which measures the extent to which individuals believe their health is the result of their own behavior (internal HLC), due to the influence of powerful others, and due to chance. The main assumption of HLC theory is that those with high internal HLC should be more likely to engage in positive health behaviors (Norman & Bennet, 1996).

Despite its general popularity in health behavior research, no studies could be located in which HLC was evaluated specifically in the context of health message framing. Therefore, one goal in the current study is to explore internal, powerful others and chance HLC in the context of loss- versus gain-framed persuasive health messages.

Purpose of the Study

As the leading cause of death in the United States, CHD is a major public health issue, despite the fact that many risk factors for the disease are preventable, especially if addressed

early in life. Grounded in prospect theory (Kahneman & Tversky, 1984; Tversky & Kahneman, 1981), health message framing has been established as an effective method of promoting positive health behaviors (see Rothman & Salovey, 1997 for a review). The primary purpose of the current study is to compare the effects of loss-framed versus gain-framed versus information-only messages on CHD risk factor screening intentions and behaviors in a population of young adults.

The current study contributes to the health message framing literature in a number of ways. It helps to fill a gap in the literature in terms of its focus on screening for CHD variables. A review of the health message framing literature revealed one published study with a CHD risk factor screening behavior as the health behavior variable under investigation. Maheswaran and Meyers-Levy (1990) studied the effect of negatively versus positively framed persuasive health messages on motivating undergraduates to obtain cholesterol tests by measuring intention to obtain a test. The current study is the first message framing study known to this author to address screening for hypertension and the first to address screening for elevated blood glucose. The current study also contributes to the message framing literature by providing data on actual behavioral outcome, in addition to behavioral intentions. The behavioral outcome measure is based on direct observation, as opposed to being based on non-verifiable participant self-report. The current study has a health information-only control group, which is an element generally missing in the message framing research (see McCaul et al., 2002, for an example). This component was included to determine if the addition of loss- or gain-framed statements have effects beyond health information alone. Additionally, the current study adds to the health message framing research by attempting to clarify the role of perceived threat and by exploring the role of health locus of control. The research hypotheses are as follows:

- Hypothesis 1: In a population of young people (who are not expected to feel particularly threatened by CHD), screening for risk factors is likely to be perceived as health-affirming as opposed to illness-detecting; therefore, screening for CHD risk-factors should be more strongly influenced by gain-framed messages than loss-framed messages (see Apanovitch et al., 2003; Rothman & Salovey, 1997), or an information-only control.

- Hypothesis 2: Following the same argument applied in Hypothesis 1, intention to screen for CHD risk-factors should be more strongly influenced by gain-framed messages than loss-framed messages or an information-only control.

- Hypothesis 3: Perceived threat should be higher in the loss-framed condition, compared to the other conditions (see Rothman et al., 1993, Experiment 2; Rothman et al., 1999, Experiment 2).

- Hypothesis 4: Perceived threat should correlate negatively with screening intention for those participants in the gain-framed condition, but positively for those participants in the loss-framed condition.

Additional goals are exploratory and include identifying predictors of screening intention and screening behavior.

CHAPTER II

METHOD

Participants

Participants were 143 students enrolled in undergraduate psychology courses at the University of North Texas (UNT). They were recruited via the psychology department research participation pool Website for a study entitled Health Communication and Individual Differences. For Part 1, participants signed up electronically to attend one of 25 group sessions offered over the course of four weeks. Because the sessions were held in small classrooms, a maximum of 10 participants were allowed to attend each session. Sessions were approximately 30 minutes in length. Participants received extra course credit for participation in Part 1 of the experiment. All participants who presented for Part 1 completed all measures.

Using a table of random numbers, participants were randomly assigned to one of three conditions: control group, gain-framed group, or loss-framed group. In an effort to force equal sample size in each condition, blocks of three participant numbers were assigned at one time so that each experimental condition was represented in each block of three (see Shadish, Cook & Campbell, 2002). Experimental packets were coded accordingly.

Part 2 was the coronary heart disease (CHD) risk factor screening portion of the experiment. Screening appointments were offered on six mornings across a four week period. In addition to detailed instructions regarding where to go on campus for the screening appointment, the online study announcement contained the following information:

> If you have completed the Health Communication and Individual Differences study, you are invited to sign up … for an individual appointment to receive free screening tests for heart disease risk factors. Screenings will include blood pressure, blood sugar (glucose), and cholesterol. In order to obtain blood glucose and cholesterol readings, a drop of blood will be obtained from a finger prick…. To insure the accuracy of screening results, the following instructions must be followed: 1) Fast overnight (i.e., no food and nothing but

> water to drink in the 12 hours prior to your appointment). 2) Avoid taking over-the-counter medications or herbal remedies during the 12-hour fasting period. 3) Do not smoke for at least 2 hours prior to your appointment. 4) Avoid exercising at least 30 minutes prior to your appointment. Upon completion, you will receive a handout with your personal screening results. Please note there is no extra credit offered for participation in the screenings.

Exclusion criteria for signing up for Part 2 of the study included pregnancy, diabetes, hypoglycemia or any other condition for which fasting was contraindicated. Because participation in Part 2 was a dependent variable, no extra credit was awarded. Part 2 participants received personal CHD risk-factor information (i.e., blood pressure, fasting plasma glucose, and lipid panel numbers), in addition to general health information on CHD risk-factors and reputable reference sources to search for further information. All participants who attended a screening appointment were allowed to participate in the screenings, although one was initially rescheduled because she had not followed the fasting instructions.

Pamphlets

Three separate health information pamphlets were developed (Appendix A). All pamphlets contained CHD information adapted from the National Heart, Lung and Blood Institute (NHLBI, 2003) document, Facts about Coronary Heart Disease, which provides basic objective information describing in lay language what CHD is and what the risk factors for CHD are. The NHLBI (2003) publication is in the public domain and may be reproduced without permission.

Pamphlet 1, for use with the control group, contained only the CHD information adapted from the NHLBI (2003) document. Pamphlet 2 contained gain-framed messages regarding CHD risk-factor screening, in addition to the general CHD information. Pamphlet 3 contained loss-

framed messages regarding CHD risk-factor screening, in addition to the general CHD information.

The gain- and loss-framed health information messages followed the same basic structure. The loss-framed message consisted of statements emphasizing possible negative consequences of not knowing one's CHD risk-factor numbers, while the gain-framed message was composed of statements emphasizing the possible positive consequences of learning one's CHD risk-factor numbers (Appendix A).

Paper and Pencil Measures

Demographic and Health Information

A questionnaire was developed to obtain demographic and health-related information, including personal and familial history of cardiovascular risk factors and disease (Appendix B).

Pamphlet Evaluations

Two items assessed whether participants' perceptions of the tone and emphasis of the pamphlets were consistent with the actual frame manipulations (Appendix B). Following procedures employed by Rothman et al. (1999, Experiment 2), one item assessed impression of the overall tone of the pamphlet on a 9-point scale ranging from -4 *mostly negative* to +4 *mostly positive*, with a zero midpoint labeled *neutral*. Another item assessed whether the pamphlet emphasized the costs of not getting screened for CHD risk factors or the benefits of getting screened. This item was also measured on a 9-point scale from -4 *costs* to 4 *benefits*, with a zero midpoint labeled *equally emphasized*. According to Rothman et al. (1999, Experiment 2), these procedures were effective in determining whether participants correctly perceived both the

overall tone (i.e., positive or negative) and emphasis (i.e., costs or benefits) of the framing manipulations. Participants in the gain-framed condition were expected to rate the pamphlet tone as more positive, with a stronger emphasis on the benefits of getting screened, while participants in the loss-framed condition were expected to rate the tone as more negative, with a stronger emphasis on the costs.

Health Belief Model (HBM) Variables

Three items measured perceived susceptibility and perceived severity (Appendix B). As mentioned previously in this volume, perceived susceptibility and perceived severity comprise the threat component of the HBM. Items assessed on a 9-point scale (with 1 indicating the least and 9 indicating the most) the personal likelihood of eventually developing CHD based on current behavior, worry about developing CHD, and the seriousness of developing CHD (see Rothman et al., 1999, Experiment 2).

A separate question assessed participant perception of the primary barrier to getting screened for CHD risk-factors, regardless of behavioral intention (Appendix B). This item was in an open-ended response format, intended to elicit possible targets for future intervention.

Health Locus of Control

The Multidimensional Health Locus of Control scales (MHLC; Wallston et al., 1978) assess perceptions of whom and what controls one's general health. The MHLC Forms A and B are equivalent versions and can be used interchangeably. Both forms consist of 18 items answered on a 6-point Likert-type scale. Responses range from 1 *strongly disagree* to 6 *strongly agree*. Forms A and B contain three, 6-item subscales: (a) internal health locus of control

(IHLC) with items such as, “If I take the right actions, I can stay healthy”; (b) chance health locus of control (CHLC) with items such as, “Luck plays a big part in determining how soon I will recover from illness”; and (c) powerful others health locus of control (PHLC) with items such as, “Whenever I recover from an illness, it’s usually because other people (for example doctors, nurses, family, friends) have been taking good care of me” (Wallston et al., 1978). IHLC measures degree of belief that personal behavior influences health status, while CHLC and PHLC measure degree of belief that external forces control one’s health. Subscale scores can each range from 6 to 36 and are intended to be used independently; thus there is no total MHLC score.

The MHLC Form A was used in the current study. Internal consistency reliabilities for the three subscales of Form A ranged from $\alpha = .67$ to $\alpha = .77$, as reported by Wallston et al. (1978). The MHLC is in the public domain and may be used in research without explicit permission (Wallston, n. d.).

Behavioral Intention

The first behavioral variable (Appendix B) assessed participant likelihood of engaging in a free CHD risk-factor screening. In continuing with procedures employed by Rothman et al. (1999, Experiment 2), participants indicated responses on a 9-point scale, from 1 *extremely unlikely* to 9 *extremely likely*.

Behavioral Outcome

The second behavioral variable addressed actual performance of the screening behavior. This was a dichotomous (i.e., yes/no) variable, operationally defined as attending a screening

appointment arranged as part of the experiment.

Physiological Measures and Apparatus

Self-reported height and weight were obtained from all participants for the purpose of calculating body mass index (BMI). Blood pressure, fasting blood glucose, and a lipid panel were obtained from those participants who attended a CHD risk-factor screening appointment (i.e., Part 2 of the experiment). All apparatus utilized in this study are available for public purchase and may be used at home.

Body Mass Index (BMI)

BMI is calculated by dividing weight in kilograms by height in meters squared (kg/m^2). BMI scores were obtained for our sample utilizing an online BMI calculator (CDC, n. d.). Each participant's height in feet and inches and weight in pounds was entered into the online calculator, which calculated BMI to the nearest tenth. BMI is calculated the same way for adults and adolescents, although interpretation differs based on relevant age group (CDC, n. d.). For the purposes of this study the adult interpretation was employed. This resulted in the classification of four, 19-year-old participants into the overweight category as adults, whereas they would not have been considered overweight using the adolescent interpretation.

Blood Pressure (BP)

Systolic and diastolic blood pressures (SBP and DBP, respectively) were assessed using a stethoscope (Mabis Healthcare, Waukegan, IL; Model Number 10-419-0601) and a manual aneroid sphygmomanometer (Alex Orthopedic, Arlington, TX; Model Number SP-500).

Blood Glucose

Per the position statement of the American Diabetes Association (ADA, 2002), screening for diabetes and prediabetes should be performed using either the fasting plasma glucose (FPG) test, or the 2-hour oral glucose tolerance test (OGTT). For the current study, FPG was measured using a blood glucose meter, or glucometer. A glucometer is a small, portable, electronic device for testing blood sugar concentrations using no more than a drop of whole blood. The Accu-Chek® Compact (Roche Diagnostics, Indianapolis, IN; serial number GF05833474) glucometer with pre-loaded test strip drum was used in the current study.

Cholesterol

The CardioChek™ PA (Polymer Technology Systems (PTS), Inc., Indianapolis, IN; serial number 601087) is a handheld, portable blood screening device that can display results within approximately two minutes. The CardioChek™ PA has the capability to perform a number of different tests on a small amount of whole blood, depending on the test strips used. In the current study PTS Panels™ Lipid Panel test strips were used to obtain measures of total cholesterol, HDL cholesterol and triglycerides. The CardioChek™ calculates estimated LDL cholesterol using the other lipid panel readings. Because the CardioChek™ does not measure triglyceride levels below 50 mg/dL, LDL is not calculated for blood samples with these levels.

Procedure

Part 1

Once all participants had arrived for a scheduled session, experimental packets were distributed. After being provided with an explanation of the procedures and given an opportunity

to ask questions, participants read and signed the informed consent form for Part 1 and then completed the questionnaire on demographic and health-related variables. Next, participants read either the loss-framed, gain-framed, or control (information-only) pamphlet and completed the pamphlet evaluation items. Participants then completed the health belief model (HBM) perceived threat items and the MHLC scales.

After all participants had completed the questionnaires, the researcher made a verbal announcement regarding upcoming opportunities to receive free CHD risk-factor screenings on campus. Participants were then given the screening intentions form to complete. After turning in their forms, participants received written reminder slips (Appendix B) with information on how to sign up online for an available appointment time to receive a free CHD risk factor screening on campus within the following few weeks.

Part 2

Participants who completed Part 1 had the opportunity to sign up online for appointment times in order to obtain free CHD risk-factor screenings. Screenings occurred in an office in the Student Health and Wellness Center on campus and were approximately 20 minutes in length. Upon arrival for an individual screening appointment, the participant was given the informed consent form for Part 2, and the researcher recorded that the participant presented for a CHD risk-factor screening appointment (i.e., the behavioral outcome measure for the study). The participant was provided a verbal description of the screening procedures and was given the opportunity to ask questions. In addition, the participant was asked a series of questions to determine if he or she followed the pre-screening instructions (Appendix B).

After resting in a seated position for at least five minutes, the participant's BP was manually measured by the auscultatory method (see Andreassi, 2000). Following the protocol outlined by Garcia-Vera, Labrador, and Sanz (1999), two BP readings were taken with the arm relaxed at heart level. The readings were taken at 2-minute intervals. If the difference obtained between the two readings was equal to or below 5 mmHg, the average of the two readings was recorded. If the difference between the two readings exceeded 5 mmHg, a third reading was obtained, and the average of all three was recorded.

FPG and cholesterol were measured following BP. The test administrator wore disposable sterile gloves for these procedures. To prepare for the blood tests, the participant's middle finger on the non-dominant hand was cleaned with an alcohol swab and allowed to air-dry. A sterile safety lancet was pressed against the side of the finger pad until the lancet discharged, piercing the skin. The first drop of blood was wiped away. The disposable test strip extending from the Accu-Chek® Compact was touched to the new drop of blood that formed on the participant's finger and held for a few seconds until the machine beeped. The FPG results were displayed within five seconds. A 40μL glass capillary tube was then touched to the next drop of blood that formed, and the tube automatically filled with blood. A plunger was then inserted into the capillary tube, and the blood was dispensed onto the exposed portion of the disposable test strip in the CardioChek™ machine. Within two minutes the CardioChek™ displayed the lipid panel results.

All participants were provided with their screening numbers in writing along with reference information on cardiovascular health. The following statement was included with the written information, "The above information is strictly for research purposes and is not intended to provide medical diagnosis. Only a licensed medical professional can provide a medical

diagnosis. If you are concerned about any of your screening numbers, you should contact your physician to discuss."

CHAPTER III

RESULTS

Descriptive Statistics

Socio-demographic Characteristics

Categorical socio-demographic characteristics of the study sample are presented in Table 1. The sample of 143 undergraduate students was 69.2% female and ranged in age from 18 to 24 years (M = 19.99, SD = 1.57). Over half of the participants (55.9%) identified themselves as Caucasian/White non-Hispanic, 27.3% as Black/African American, 11.2% as Hispanic/Latino-American, 2.1% as Asian/Asian-American, 2.1% as Other/Mixed-race and 1.4% as American Indian/Alaskan Native. The majority of participants identified the United States as country of origin (86.7%). In terms of religious/spiritual affiliation 78.2% identified as Christian, with the second highest number (16.2%) reporting no affiliation. The vast majority of participants (97.2%) reported marital status as single, never married. Median annual family income was $50,000 to $75,000, and family size supported by annual income ranged from 1 to 9 (M = 3.43, SD = 1.59). All four levels of undergraduate classification were represented, from a low of 20 (14.1%) seniors, to a high of 49 (34.5%) freshmen. Approximately 44% of the participants' mothers and fathers had at least a college degree.

Health Characteristics

Categorical health characteristics and health behaviors of the study sample are presented in Table 2. Body mass index (BMI) was calculated from self-reported height and weight and ranged from 17.8 to 45.2 (Mdn = 22.7). Based on self-reported weight category, 20.3% of the sample considered themselves to be overweight, although BMI scores indicated that 28% of the

sample was overweight (BMI ≥ 25.0). Of the 40 overweight participants, 12 met criteria for obesity (BMI ≥ 30.0) and one of those 12 met criteria for morbid obesity (BMI ≥ 40.0). Based on BMI calculated from self-reported height and weight, 81.8% of participants accurately classified themselves as either underweight, normal weight, or overweight.

Participants reported exercising an average of 2.66 days per week (*SD* = 1.76, range = 0-7), with 53.8% reporting exercising at least three days per week. Approximately half of the participants considered their eating habits to be healthy (52.4%) and considered themselves to be physically fit (51.7%). Just over 90% of participants identified as non-smokers. Median number of physician visits per year was reported as 1.50. Overall, 79% of participants described themselves as "healthy," while 21% described themselves as "unhealthy."

Sixty-five percent of participants reported having at least one biological parent or sibling with at least one CHD-related condition (i.e., heart attack, stroke, high blood pressure, high cholesterol, diabetes, or overweight). In terms of personal CHD risk, 63.6% of participants reported at least one major risk-factor (i.e., overweight, lack of recommended physical activity, smoking, high blood pressure, high cholesterol, or diabetes). Participants reported an average of .89 personal CHD risk factors (*SD* = .83, range 0-3) and median family risk factors of 1.00. The most frequently reported personal CHD risk factor was physical inactivity (46.2%), followed by overweight (20.3%).

Table 3 presents prior screening for major CHD risk factors. Approximately 90% (*n* = 129) of the sample reported prior screening for high blood pressure, 32.4% (*n* = 46) reported obtaining a cholesterol test, and 30.7% (*n* = 43) reported obtaining a blood sugar test. Of the participants who had prior screening tests, 0 out of 43 reported a diagnosis of diabetes, 5 out of 129 (3.9%) reported high blood pressure, and 6 out of 46 (13%) reported high cholesterol.

Health Belief Model (HBM) Variables

Means and standard deviations were calculated for the three HBM items measuring susceptibility and severity. Each item ranged from 1, indicating the least amount of the variable, to 9, indicating the greatest amount of the variable. Overall, participants rated the severity of having CHD as fairly high ($M = 7.02$, $SD = 1.98$). In terms of susceptibility, participants reported belief that they had a fairly equal chance ($M = 4.16$, $SD = 1.99$) of developing or not developing CHD, given their current behaviors. Likewise, participants reported being only somewhat worried ($M = 4.13$, $SD = 2.25$) about eventually developing CHD.

Regardless of what participants indicated their behavioral intentions were in terms of getting screened, each was asked to provide a one-sentence answer indicating the primary reason why he or she would *not* take advantage of an opportunity to receive a free CHD risk-factor screening. A qualitative analysis was conducted to identify a list of primary barriers to screening in this population. Two raters independently coded responses and discrepancies were discussed until agreement was reached. Coding resulted in the identification of 11 response categories (Table 4). The four most frequent reasons given for not obtaining a free CHD risk-factor screening were being too busy in general (32.9%), followed by not feeling at risk (21.7%), having a specific schedule conflict (18.2%), and fearing the screening results (7.0%).

Multidimensional Health Locus of Control (MHLC)

Means and standard deviations were calculated for the three MHLC scales. Missing subscale items were replaced with the mean of the available items for that subscale. Each subscale (i.e., internal health locus of control [IHLC], powerful others health locus of control [PHLC], and chance health locus of control [CHLC]) had a possible range of 6 to 36. Among the

three subscales, participants reported the strongest belief in the ability of their own behaviors to influence their health (M = 26.83, SD = 3.99, range = 15-36), with less belief in the influence of powerful others (M = 18.13, SD = 4.47, range = 8-32) or chance (M = 15.46, SD = 4.57, range = 6-27).

Screening Intention

The mean and standard deviation were calculated for the screening intention variable (M = 6.16, SD = 2.36, range = 1-9). Participants in general indicated they were more likely than not to make an appointment sometime soon to get screened for CHD risk factors, with 1 indicating *extremely unlikely* and 9 indicating *extremely likely*.

Part 2 – CHD Risk-Factor Screening

Overall, 11.2% (n = 16) of the participants from Part 1 attended a CHD risk-factor screening appointment. Part 2 participants were similar in age to those who were not screened (M = 20.19, SD = 1.76 and M = 19.97, SD = 1.55, respectively). Median BMI was 22.0 (range = 17.9-35.5) for the Part 2 participants and 22.7 (range 17.8-45.2) for those who were not screened. Fifteen of the 16 Part 2 participants (93.8%) were female, compared to 66.1% of those who were not screened. Select categorical socio-demographic and health characteristics of participants by screening group (i.e., screened versus not screened) are presented in Table 5.

Fifteen (93.8%) of the Part 2 participants had their blood pressure measured previously, while only 3 (18.8%) had a prior blood sugar test and 4 (25%) had a prior cholesterol test (Table 5). Results of the Part 2 CHD risk-factor screenings are presented in Table 6. Although the majority of participants had normal systolic (62.5%) and diastolic (75.0%) blood pressure

results, a few had results in the prehypertensive range (31.3% of systolic and 25.0% of diastolic readings). One participant had systolic blood pressure results in the hypertensive range. Overall, 43.8% of Part 2 participants had a blood pressure reading in at least the prehypertensive range. Results of fasting plasma glucose (FPG) tests for all participants fell in the normal range. Lipid panel results varied. Ten (62.5%) participants had total cholesterol results in the "desirable" range, while the remaining 6 (37.5%) had results in the "borderline high" range. Eleven (68.8%) participants had HDL cholesterol results in the "low" range, while only 3 participants had results in the "desirable" range. Most participants (87.5%) had triglyceride results in the "normal" range, and the remaining two (12.5%) had results in the "borderline high" range. Estimated LDL cholesterol results were available for 14 participants. Results fell in the "optimal" range for 35.7% of participants, 28.6% of participants had results in the "near optimal" range, another 28.6% were in the "borderline high" range, and one participant had results in the "high" range.

Preliminary Analyses

Randomization Check

To ensure successful random assignment of the study sample among the three experimental groups, chi-square tests were computed for several socio-demographic and health-related variables. Results of the tests for distributional differences are presented in Table 7, along with summary descriptive data across the three groups. It was necessary to collapse categories for the ethnic background and religious/spiritual affiliation variables to ensure that no cells in the associated contingency table would have expected counts less than 5. Results indicated successful randomization, as no statistically significant differences were observed for any of the 17 variables among the three experimental conditions (all p values > .05). In addition, one-way

analyses of variance (ANOVA) revealed no statistically significant differences in age, $F(2, 140) = .06$, $p > .05$, or BMI, $F(2, 140) = .65$, $p > .05$, between the three experimental groups.

Risk Index

A reliability estimate was performed to determine if the three health belief model (HBM) items measuring susceptibility and severity could be combined to form a single *threat* index. The three items did not statistically hold together to form a threat index; however, the first two items (i.e., "If you continue taking care of your body the way you are now, what do you feel is the likelihood you will eventually develop coronary heart disease?" and "How worried are you about eventually developing coronary heart disease?") were combined to form a *risk* index (Chronbach's alpha = .71) ranging from 2 to 18. The third HBM item (i.e., "If you were to develop coronary heart disease, how serious of a problem do you think it would be?") was used to measure severity separately.

Framing Manipulation Check

Adopting procedures described by Rothman et al. (1999, Experiment 2), two items assessing perceived tone and emphasis were included to determine whether participants correctly perceived the intended frame of the experimental pamphlets. Participants in the gain-framed condition were expected to rate the pamphlet tone as more positive, with a stronger emphasis on the benefits of getting screened, while participants in the loss-framed condition were expected to rate the tone as more negative, with a stronger emphasis on the costs. One-way ANOVA revealed no statistically significant difference in ratings of pamphlet tone between the three experimental conditions, $F(2, 140) = .31$, $p > .05$ (Table 8). Overall pamphlet tone was generally

perceived as neutral, with a range from -4 *extremely negative* to 4 *extremely positive*. One-way ANOVA also revealed no statistically significant framing effects on ratings of pamphlet emphasis, $F(2, 140) = .53$, $p > .05$. The pamphlet was judged as emphasizing costs and benefits fairly equally. A rating of -4 indicated the pamphlet was perceived as exclusively emphasizing the *costs* of not getting screened for CHD risk factors, while a rating of 4 indicated exclusive emphasis on the *benefits* of getting screened.

Primary Analyses (Hypothesis Testing)

Because the manipulation check revealed the framing intervention to be unsuccessful, and all four hypotheses were based upon successful intervention, no hypothesis testing was conducted. The three experimental groups were pooled for all subsequent analyses.

Exploratory Analyses

To determine if relationships existed between select socio-demographic and health-related variables and screening outcome (i.e., screened versus not screened), chi-square tests of association were computed (Table 5). Ethnic background was recoded into "White (Non-Hispanic)" and "All other groups" to reach adequate expected cell frequencies. Because of low expected cell frequencies, Fisher's exact test was interpreted for gender, overweight, overall health, and prior screenings. Of the 12 variables tested, only gender was significantly related to screening outcome ($p < .05$, Fischer's Exact Test). Females were significantly more likely to be screened than males. One-way ANOVAs revealed no significant differences between the screening outcome groups on the continuous variables of age $F(1, 141) = .274$, $p > .05$) or BMI $F(1, 141) = .013$, $p > .05$).

A multiple linear regression was performed to identify potential significant predictors of behavioral intention. Following the rule of thumb for cases to predictor ratio of 20 to 1, seven predictor variables were included in the model. The predictor variables in the equation were the demographic variables of gender and age, the two HBM variables (severity and risk index), and the three MHLC variables (internal, powerful others and chance). All variables were entered into the equation at once, resulting in a significant model, adjusted $R^2 = .195$, F (7, 135) = 5.91, $p <$ .001. PHLC ($B = .156$, $\beta = .296$, $p < .001$), risk index ($B = .175$, $\beta = .277$, $p = .001$), and age ($B =$ .299, $\beta = .200$, $p < .05$) were significant predictors of behavioral intention (Table 9).

CHAPTER IV

DISCUSSION

Purpose of the Study

The primary purpose of the current study was to examine the effects of loss-framed vs. gain-framed vs. information-only health messages on both intention to attend and actual attendance at an appointment to get screened for coronary heart disease (CHD) risk factors (i.e., prehypertension/hypertension, prediabetes/diabetes, and dyslipidemia). Health message framing is a widely researched communication strategy for promoting health behaviors and is theoretically grounded in prospect theory (Kahneman & Tversky, 1984; Tversky & Kahneman, 1981).

CHD was the illness targeted in the current study for a number of reasons. For one, CHD is the number one cause of death in the United States for both men and women (American Heart Association [AHA], 2005), making it an extremely relevant topic. Two, not only are numerous risk-factors for CHD well established, but many of them are preventable as well (National Heart, Lung and Blood Institute [NHLBI], 2003). Three, the prevalence of CHD risk-factors is increasing in adolescents and young adults, and longitudinal research (e.g., Tulane Center for Cardiovascular Health, n. d.) has established that contributory processes such as atherosclerosis actually begin developing in childhood. Finally, few health message framing research studies have focused on risk-factors for CHD (see Maheswaran & Meyers-Levy, 1990).

It was hypothesized that a population of young adults would be more likely to view screening for CHD risk factors as a low-risk, health-affirming behavior as opposed to a risky, illness-detecting behavior and would thus be more strongly influenced by gain-framed messages than loss-framed messages (see Apanovitch et al., 2003). These hypotheses were contrary to the

general findings in message-framing research that loss-framed messages are more effective than gain-framed messages at promoting detection intentions and behaviors, while gain-framed messages are more effective at promoting prevention intentions and behaviors (see Rothman & Salovey, 1997, for a review). An additional goal was to explore the extensively researched individual health beliefs of perceived threat and health locus of control as they relate to message frames.

Framing manipulation checks revealed that participants failed to discern differences in the tone and emphasis of the experimental pamphlets. As a result, no tests of framing effects could be conducted because any group differences that might have been found could not be attributed to the experimental manipulation. Analyses were therefore focused on predicting screening intention and identifying differences between screening groups (i.e., screened vs. not screened).

Findings and Implications

An exploratory multiple regression analysis revealed interesting results in terms of predictors of behavioral intention. Risk index was one of the three significant predictors that emerged. The higher a participant's perceived risk of developing CHD, the higher his or her intention to get screened, even though risk overall was not very high. It may be that in this young population, risk does not necessarily need to be high to influence behavioral intention, just *higher* than that of one's peers. Similar to the current findings, Rothman et al. (1999, Experiment 1) reported a positive correlation between perceived risk of developing a fictitious viral infection and intention to perform recommended behaviors.

Age was also a significant predictor of behavioral intention, such that the older a participant was, the greater his or her intention to get screened. This finding was surprising considering the participant sample's rather restricted age range of 18 to 24 years. Perhaps health issues become more salient with age even in this relatively young age group.

Powerful others health locus of control (PHLC) was another factor to emerge as a significant predictor of behavioral intention. This finding was also somewhat surprising, considering that high *internal* locus of control (IHLC) is the HLC element generally associated with preventive health behaviors (see Norman & Bennett, 1996, for a review). However, Norman & Bennett point out that having a strong belief in the role of powerful others may be predictive of a health behavior when that behavior has been recommended by a health professional. In relation to the current findings, the researcher may have been perceived as a "powerful other." In addition, social desirability may have been a factor, since the participants were asked to indicate their screening intentions immediately after being informed by the researcher of upcoming opportunities to get screened on campus. It is important to note that although the overall regression model was significant, the predictors together explained less than 20% of the variance in behavioral intention, leaving much to be explained.

A very small percentage (11.2%, $n = 16$) of the 143 participants who participated in Part 1 of the experiment actually participated in Part 2 (i.e., the risk factor screenings). Out of 12 selected socio-demographic and health characteristics, the only variable that was significantly related to screening outcome was gender, such that women were more likely to get screened than men. However, analyses were limited by small sample size for Part 2. Likewise, a planned logistic regression to identify predictors (e.g., screening intention, HLC, etc.) of screening

behavior (i.e., screened vs. not screened) could not be conducted due to low turn-out for Part 2, which resulted in unacceptably low expected cell frequencies.

A variety of health information was collected from participants in the current study, much of which emphasizes the need to target CHD prevention efforts at people of this age demographic. Approximately 64% of participants in the current study reported at least one of the six major preventable risk factors for CHD (i.e., overweight/obesity, lack of physical activity, smoking, hypertension, high cholesterol, and diabetes). The most prevalent of these was exercising less than three days per week on average (46.2%) and overweight/obesity (28%). Because these numbers were based on self-report and not objective measurement, they may be an underestimate of actual prevalence.

While not diagnostic, the objective measurements that were collected on the small sub-sample of 16 participants who presented for CHD risk-factor screenings also lend support to targeting this young population. Although none of the sample had fasting plasma glucose (FPG) numbers in the prediabetic or diabetic ranges, roughly 44% (n = 7) had a systolic and/or diastolic blood pressure reading in at least the prehypertensive range, with one of the systolic readings falling in the hypertensive range. In terms of lipid panel numbers, only 3 (18.8%) of the 16 screened participants had HDL (i.e., "good") cholesterol in the heart-protective range, while 6 (37.5%) had total cholesterol at greater than desirable levels. As stated previously, gender was the only variable that appeared to differentiate the screened from non-screened groups, suggesting that these results may be generalizable to the non-screened participants.

Framing Manipulation

One possible explanation for the lack of perceived differences in the framed messages

included in the current study is that the specific tone and emphasis of the frames may have been too subtle to be detected. The flip-side of this argument should also be considered: It may have been that the tone and emphasis were apparent but that the participants were simply scanning the content and not attending closely enough to detect them. In addition, because unframed health information constituted the bulk of the information provided across the three experimental groups, the addition of a few framed statements in the two framing conditions may not have been powerful enough to capture the participants' attention. "Heart health" itself is not a novel subject, even though the issue of heart health specifically in young people receives much less attention. According to Rothman and Salovey (2006), familiarity with a health issue may lead to not seeking out or attending to new information. In terms of the current study, it may have been that participants did not attend to the age-relevant information presented alongside of the possibly overly-familiar information on CHD risks. This may be evidenced by the acknowledgement by participants of the relatively high severity of CHD, but relatively low perceived personal risk.

It is also possible that the two manipulation check items were not effective at measuring perceptions of the message frames. For example, it is possible that participants responded to the question about pamphlet *tone* by attending to their own affective reactions to the pamphlet as opposed to reporting the tone of the pamphlet itself. In terms of pamphlet *emphasis*, perhaps employing items such as those used by Maheswaran and Meyers-Levy (1990) in which positive and negative emphasis were assessed on separate scales as opposed to one dichotomous scale would offer a more effective measure.

Regardless of cause, the failure of the framing manipulation is the primary limitation to the present study. The effects of different types of message frames on behavioral intention and outcome cannot be analyzed if the frame tone and/or emphasis are not recognized as different by

the population under study. This major limitation may have been avoided in the current study by conducting a pilot study to test the perceived tone and emphasis of the message frames. However, this does not appear to be a common practice in message-framing research, as a review of the literature revealed no study that reported using a pilot study to test message perceptions. This limitation points to the importance of establishing clear guidelines for gain- and loss-framed message development in order to help researchers to most effectively manipulate how health appeals are perceived. Although it is common for researchers in health message framing to provide examples of the message frames they utilize in their studies (e.g., Apanovitch et al., 2003, Maheswaran & Meyers-Levy, 1990, Rothman et al., 1999, Experiment 1), it is not common practice to reference any guiding literature or to describe specifics of the process of developing the frames. Such information could prove very useful to fellow researchers, as it is equally important to know what does and does not work in terms of developing effective frames.

Another important but largely overlooked issue in the message framing literature concerns the actual inclusion of framing manipulation checks. In their 1999 study, Rothman et al. addressed the issue that little attempt had been made to check the effectiveness of framing manipulations (Experiment 2). It is unknown how often framing manipulations actually fail, since it is the studies that have either verified successful framing manipulations (e.g., Block & Keller, 1995; Gerend & Shepherd, 2007; Maheswaran & Meyers-Levy, 1990; Rivers et al., 2005; Rothman et al., 1999, Experiment 2; Toll et al., 2007), or those that do not include framing manipulation checks (e.g., Apanovitch et al., 2003; Banks et al., 1995; Detweiler et al., 1999; Rothman et al., 1999, Experiment 1), that have been published. The latter raises validity questions in terms of message-framing research, because without verifying that framing

manipulations were correctly perceived, one cannot legitimately attribute effects to message frames.

Other Limitations of the Study

In addition to the lack of successful framing manipulation, other limitations of the present study may have been the restricted appointment times and follow-up timeframe. Given that in the present study the third most frequently reported perceived barrier to attending a screening appointment was the presence of a specific schedule conflict, and that the appointments were restricted to six mornings across a consecutive four week period, it is possible that many students' class times coincided with the available appointment times. However, reminder slips did provide participants the option of contacting the researcher if they wanted a screening appointment but available times conflicted with their schedules.

In terms of follow-up timeframe, depending on when they participated in Part 1, students only had from a few days to a few weeks to participate in Part 2. This timeframe may have been too restrictive, especially considering that it is not unusual for health message-framing studies to measure follow-up at multiple endpoints several months out (e.g., Apanovitch et al., 2003; Banks et al., 1995). In addition to observed or self-reported attendance at a screening appointment, additional outcomes of interest should be considered. For instance, whether or not participants actually changed any relevant health behaviors such as diet or exercise would be very informative, as would more subtle behaviors, such as whether or not participants asked medical professionals about risk-factors or researched them further on their own, or discussed risk-factors with friends or family.

As mentioned previously, statistical analyses were limited by the lack of framing effects, as well as the small number of participants who participated in Part 2 of the study. Due to the small follow-up numbers, statistical power was low for analyses comparing the screened versus not screened groups. A final limitation involves the generalization of the current findings. Even though the target audience of the research was young adults, the sample of undergraduate participants (seeking extra course credit in the case of Part 1) cannot be assumed to be representative of young adults in general.

Strengths of the Current Study

In spite of its major limitations, the current study exhibited a number of strengths in terms of study design. The inclusion of an information-only group is relatively rare in health message-framing research. Apanovitch et al. (2003) addressed their lack of an information-only control by arguing in part that including such a condition was unnecessary because their hypotheses specified whether loss- or gain-framed messages were more effective for particular groups and not whether framed messages were more effective compared to an information-only control. Yet regardless of hypotheses, without this unframed condition one cannot know for certain if the additional framed information has a greater effect than the health information alone, which is especially important in real world public health applications. For example, McCaul et al. (2002) found that neither loss- nor gain-framed messages improved flu vaccination rates in community-dwelling elderly when compared with a neutral reminder message. If specific framed health appeals are shown to be no more effective than basic health information alone, then the costs of developing and disseminating framed appeals is unlikely to be justifiable.

An additional strength of the current study is the inclusion of the framing manipulation check items. Without the inclusion of these items, a major limitation of the study would have been over-looked. The failure of the current framing manipulations underscores the need to include manipulation checks in all health message framing studies.

Finally, the inclusion of an observable behavioral outcome is an element worthy of mention. While some health message framing studies do rely on behavioral outcome measures (e.g., McCaul et al., 2002), this is not the norm. The majority of message framing research focuses either on behavioral intention alone (e.g., Detweiler et al., 1999; Maheswaran & Meyers-Levy, 1990; Rothman et al., 1999, Experiments 1 & 2), or on behavioral outcomes based on self-report (e.g., Apanovitch et al., 2003; Banks et al., 1995; Rivers et al., 2005). In the current study, behavioral outcome was directly observed by the researcher, removing any self-report bias from the equation.

Future Directions

Despite the largely preventable nature of the illness, CHD continues to be the leading cause of death in both men and women in the United States (AHA, 2005). Given that the processes that lead to CHD can begin in childhood and develop over decades, it is imperative that effective prevention efforts be developed to motivate young adults to address CHD risk factors early in life, before long-term damage has occurred. Health message framing research has a lot to offer in this area, and faces the major challenges of making CHD a salient issue for young adults and of promoting "heart healthy" behaviors. As Rothman and Salovey (2006) point out, "The more readily people are able to differentiate themselves from someone with a health problem, the less at risk they consider themselves to be" (p. 828). In relation to the current study,

18- to 24-year-olds are not likely to relate to the heart-attack sufferer stereotype. When questioned about barriers to CHD risk-factor screening, the second highest number of participants indicated that they simply did not "feel" at risk, many because they were "too young." Clearly more is needed to get this population's attention. In addition, research should address whether effectively promoting the short-term goal of risk-factor screening significantly contributes to the long-term goal of preventive behavior change. While getting screened for CHD risk-factors is a relatively simple, discrete act, actually preventing or managing CHD risk-factors requires engaging in sustained behaviors, which is a much more challenging proposition.

Table 1

Categorical Socio-demographic Characteristics of Complete Sample

Characteristic	*n*	%
Gender		
Male	44	30.8
Female	99	69.2
Ethnic background		
Black / African American	39	27.3
Caucasian / White (Non-Hispanic)	80	55.9
Hispanic / Latino(a) American	16	11.2
Asian / Asian American	3	2.1
American Indian / Alaskan Native	2	1.4
Other / Mixed-race	3	2.1
Country of origin		
United States	124	88.6
Other	16	11.4
Religious / spiritual affiliation		
Christian	111	78.2
Jewish	2	1.4
Hindu	1	.7
None	23	16.2
Other	5	3.5

(table continues)

Table 1 *(continued)*.

Characteristic	*n*	%
Marital status		
Single, never married	139	97.2
Single, living with significant other	3	2.1
Married	1	.7
Annual family income		
Less than $25,000	27	19.0
$25,000 to $50,000	29	20.4
$50,000 to $75,000	28	19.7
$75,000 to $100,000	19	13.4
Greater than $100,000	39	27.5
Classification		
Freshman	49	34.5
Sophomore	39	27.5
Junior	34	23.9
Senior	20	14.1
Highest Degree		
High school diploma / GED	129	90.8
Associates / technical	13	9.2
Mother's education		
College degree or higher	61	43.6

(table continues)

Table 1 *(continued)*.

Characteristic	*n*	%
No college degree	79	56.4
Father's education		
College degree or higher	60	44.1
No college degree	76	55.9

Note: The *n*'s for each characteristic do not necessarily equal 143 due to missing values.

Table 2

Categorical Health Characteristics and Behaviors of Complete Sample

Characteristic	*n*	%
Weight categorization (subjective)		
Underweight	5	3.5
Normal weight	109	76.2
Overweight	29	20.3
Accuracy of weight categorization		
Accurate	117	81.8
Inaccurate	26	18.2
Overweight (objective)		
Yes	40	28.0
No	103	72.0
Activity level		
Inactive (exercise less than 3 days per week)	66	46.2
Active (exercise 3 or more days per week)	77	53.8
Nutrition		
Healthy	75	52.4
Unhealthy	68	47.6
Physical fitness		
Fit	74	51.7
Unfit	69	48.3

(table continues)

Table 2 *(continued)*.

Characteristic	*n*	%
Overall health		
Healthy	113	79.0
Unhealthy	30	21.0
Birth control medication (*n* = 99 females)		
Yes	43	43.4
No	56	56.6
Smoker		
Yes	14	9.8
No	129	90.2
Family history of CHD or risk-factors		
Yes	93	65.0
No	50	35.0
Personal CHD risk-factors		
Yes	91	63.6
No	52	36.4

Table 3

*CHD Risk-Factor Screening History and Reported Classification Level (*N = *143)*

	Yes		No		High		Not high		Unsure	
Screening domain	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%
Blood pressure	129	90.2	14	9.8	5	3.9	114	89.1	9	7.0
Blood sugar	43	30.7	97	69.3	[a]	--	--	--	--	--
Cholesterol	46	32.4	96	67.6	6	13.0	37	80.4	3	6.5

[a] Participants who indicated having had their blood sugar tested were asked if they had been diagnosed with diabetes, which none reported.

Table 4

Perceived Primary Barriers to CHD Risk-Factor Screening

	Screened (*n* = 16)		Not screened (*n* = 127)	
Category	*n*	%	*n*	%
Generally too busy	7	43.8	40	31.5
Believe healthy/not at risk	2	12.5	29	22.8
Specific schedule conflict	5	31.3	21	16.5
Fear of outcome	0	0	10	7.9
Apathy/forgetfulness	1	6.3	8	6.3
Inconvenient wait time/location	0	0	6	4.7
No reason given	1	6.3	4	3.1
Prior screening	0	0	4	3.1
Rely on physician direction	0	0	2	1.6
Fear of needles	0	0	2	1.6
Advertisement appeal	0	0	1	0.8

Table 5

Select Socio-demographic and Health Characteristics/Behaviors by Screening Group

	Screened (n = 16)		Not Screened (n = 127)			
Characteristic	*n*	%	*n*	%	X^2	*df*
Gender					FET[1,*]	1
Male	1	6.3	43	33.9		
Female	15	93.8	84	66.1		
Ethnic background					1.09[2]	1
Black / African American	4	25.0	35	27.6		
Caucasian / White (Non-Hispanic)	7	43.8	73	57.5		
Hispanic / Latino(a) American	3	18.8	13	10.2		
Asian / Asian American	1	6.3	2	1.6		
American Indian / Alaskan Native	0	0	2	1.6		
Other / Mixed-race	1	6.3	2	1.6		
Overweight (objective)					FET[1]	1
Yes	5	31.2	35	27.6		
No	11	68.8	92	72.4		
Activity level					.54	1
Inactive (exercise less than 3 days per week)	6	37.5	60	47.2		
Active (exercise 3 or more days per week)	10	62.5	67	52.8		
Nutrition					3.25	1
Healthy	5	31.3	70	55.1		

(table continues)

Table 5 *(continued)*.

	Screened (n = 16)		Not Screened (n = 127)			
Characteristic	*n*	%	*n*	%	X^2	*Df*
Unhealthy	11	68.8	57	44.9		
Physical fitness					.02	1
Fit	8	50.0	66	52.0		
Unfit	8	50.0	61	48.0		
Overall health					FET[1]	1
Healthy	13	81.3	100	78.7		
Unhealthy	3	18.8	27	21.3		
Family history of CHD or risk-factors					2.08	1
Yes	13	81.2	80	63.0		
No	3	18.8	47	37.0		
Personal CHD risk-factors					.01	1
Yes	10	62.5	81	63.8		
No	6	37.5	46	36.2		
Prior blood pressure screening					FET[1]	1
Yes	15	93.8	114	89.8		
No	1	6.3	13	10.2		
Prior blood sugar screening					FET[1]	1
Yes	3	18.8	40	32.3		

(table continues)

Table 5 *(continued)*.

Characteristic	Screened (*n* = 16) *n*	%	Not Screened (*n* = 127) *n*	%	X^2	*df*
No	13	81.3	84	67.7		
Prior cholesterol screening					FET[1]	1
Yes	4	25.0	42	33.3		
No	12	75.0	84	66.7		

[h] Fisher's exact test (FET) was interpreted instead of Pearson chi-square, due to low expected cell frequencies.

[2] Computed for a dichotomized ethnic background variable, defined as "White (Non-Hispanic)" and "All other groups." Dichotomizing was necessary to obtain adequate cell sample size.

[*] $p < .05$

Table 6

*Part 2 CHD Risk-Factor Screening Results (*n *= 16)*

Screening results	*n*	%
Blood pressure – systolic		
Normal (< 120 mm Hg)	10	62.5
Pre-hypertensive (120 – 139 mm Hg)	5	31.3
Hypertensive (≥ 140 mm Hg)	1	6.3
Blood pressure – diastolic		
Normal (< 80 mm Hg)	12	75.0
Pre-hypertensive (80 – 89 mm Hg)	4	25.0
Hypertensive (≥ 90 mm Hg)	0	0
Blood sugar (fasting plasma glucose)		
Normal (< 100 mg/dL)	16	100
Pre-diabetic (100 – 125 mg/dL)	0	0
Diabetic (≥ 126 mg/dL)	0	0
Cholesterol – total		
Desirable (< 200 mg/dL)	10	62.5
Borderline high (200 – 239 mg/dL)	6	37.5
High (≥ 240 mg/dL)	0	0
Cholesterol – LDL (estimated)		
Optimal (< 100 mg/dL)	5	35.7
Near optimal (100 – 129 mg/dL)	4	28.6

(table continues)

Table 6 *(continued)*.

Screening results	*n*	%
Borderline high (130 – 159 mg/dL)	4	28.6
High (160 – 189 mg/dL)	1	7.1
Very high (≥ 190 mg/dL)	0	0
Cholesterol – HDL		
High – desirable (≥ 60 mg/dL)	3	18.8
Low (< 40 mg/dL male; < 50 mg/dL female)	11	68.8
Cholesterol – triglycerides		
Normal (< 150 mg/dL)	14	87.5
Borderline high (150 – 199 mg/dL)	2	12.5
High (≥ 200 mg/dL)	0	0

Table 7

Results of Chi-Square Tests for Socio-demographic and Health Variables by Frame

	Gain (n = 48)		Loss (n = 47)		Control (n = 48)			
Variable	n	%	n	%	n	%	X^2	df
Gender							2.22	2
Male	18	37.5	11	23.4	15	31.3		
Female	30	62.5	36	76.6	33	68.8		
Ethnic background							3.78	4
Black / African American	12	25.0	17	36.2	10	20.8		
Caucasian / White (Non-Hispanic)	27	56.3	22	46.8	31	64.6		
All other groups	9	18.8	8	17.0	7	14.6		
Country of origin							0.13	2
United States	43	89.6	40	88.9	41	41.6		
Other	5	10.4	5	11.1	6	12.8		
Religious/spiritual affiliation							2.85	2
Christian	40	85.1	37	78.7	34	70.8		
Not Christian	7	14.9	10	21.3	14	29.2		
Annual family income							8.95	8
Less than $25,000	9	18.8	8	17.4	10	20.8		
$25,000 to $50,000	9	18.8	14	30.4	6	12.5		
$50,000 to $75,000	12	25.0	7	15.2	9	18.8		

(table continues)

Table 7 *(continued)*.

	Gain (n = 48)		Loss (n = 47)		Control (n = 48)			
Variable	n	%	n	%	n	%	X^2	df
$75,000 to $100,000	3	6.3	7	15.2	9	18.8		
Greater than $100,000	15	31.3	10	21.7	14	29.2		
Classification							8.86	6
Freshman	17	36.2	17	36.2	15	31.3		
Sophomore	13	27.7	13	27.7	13	27.1		
Junior	6	12.8	14	29.8	14	29.2		
Senior	11	23.4	3	6.4	6	12.5		
Mother's education							1.28	2
College degree or higher	23	48.9	20	44.4	18	37.5		
No college degree	24	51.1	25	55.6	30	62.5		
Father's education							0.42	2
College degree or higher	21	47.7	18	40.9	21	43.8		
No college degree	23	59.1	26	59.1	27	56.3		
Overweight (objective)							2.39	2
Yes	13	27.1	10	21.3	17	35.4		
No	35	72.9	37	78.7	31	64.6		
Activity level							0.04	2
Inactive (exercise < 3 days/week)	13	27.1	10	21.3	17	35.4		

(table continues)

Table 7 *(continued)*.

	Gain (n = 48)		Loss (n = 47)		Control (n = 48)			
Variable	*n*	%	*n*	%	*n*	%	X^2	df
Active (exercise 3+ days/week)	35	72.9	37	78.7	31	64.6		
Nutrition							1.80	2
Healthy	22	45.8	28	59.6	25	52.1		
Unhealthy	26	54.2	19	40.4	23	47.9		
Physical fitness							2.68	2
Fit	29	60.4	24	51.1	21	43.8		
Unfit	19	39.6	23	48.9	27	56.3		
Overall health							5.23	2
Healthy	42	87.5	38	80.9	33	68.8		
Unhealthy	6	12.5	9	19.1	15	31.3		
Family history of CHD risk-factors							1.01	2
Yes	17	35.4	14	29.8	19	39.6		
No	31	64.6	33	70.2	29	60.4		
Personal CHD risk-factors							0.90	2
Yes	18	37.5	19	40.4	15	31.3		
No	30	62.5	28	59.6	33	68.8		
Prior blood sugar screening							4.41	2
Yes	19	41.3	14	29.8	10	21.3		

(table continues)

Table 7 *(continued)*.

	Gain (n = 48)		Loss (n = 47)		Control (n = 48)			
Variable	*n*	%	*n*	%	*n*	%	X^2	df
No	27	58.7	33	70.2	37	78.7		
Prior cholesterol screening							0.86	2
Yes	14	29.8	14	29.8	18	37.5		
No	33	70.2	33	70.2	30	62.5		

Note. No outcomes were significant at the $p < .05$ level.

Table 8

Pamphlet Evaluations by Framing Condition

	Gain-framed (n = 48)		Loss-framed (n = 47)		Control (n = 48)		
Pamphlet characteristic	*m*	*sd*	*m*	*sd*	*m*	*sd*	F (2, 140)
Tone	0.69	2.27	0.51	2.26	0.33	2.04	0.31
Emphasis	0.00	2.54	-0.17	2.50	-0.52	2.57	0.53

Note. No outcomes were significant at the $p < .05$ level.

Table 9

Results of Regression Analysis for Predictors of Screening Intention (N = 143)

Predictor	*B*	*SE B*	β
Gender	.233	.400	.046
Age	.299	.117	.200
HBM: Risk index	.175	.050	.277
HBM: Severity	-.023	.097	-.020
HLC: Internal	.013	.046	.022
HLC: Chance	-.066	.043	-.129
HLC: Powerful others	.156	.041	.296

Note. Adjusted R^2 = .195

APPENDIX A

PAMPHLET AND FRAMES

Facts about Coronary Heart Disease

- Coronary heart disease (CHD) is the #1 cause of death for Americans.
- CHD often results in a heart attack. Approximately 1 million Americans suffer a heart attack each year. Half of these heart attacks (approximately 500,000) are fatal.
- Atherosclerosis is the primary process leading to a heart attack. In atherosclerosis, fatty substances called “plaques” build up inside the walls of blood vessels, eventually causing them to narrow and harden. This process takes place over decades.
- In CHD, these plaques build up in the coronary arteries, slowly decreasing blood flow to the heart. A heart attack results when the blood supply is almost or completely cut off, causing heart cells to die from lack of oxygen.
- Extensive research has shown that the process of atherosclerosis can begin in childhood, even in children as young as 5 years old. Think about that. The process can start when you are 5 years old, but it would not be unusual for you to be unaware that anything was wrong until you had a heart attack.

Risk Factors for Coronary Heart Disease

- Risk factors for CHD are behaviors and conditions that increase your risk of developing CHD.
- Major risk factors for CHD include:
    - High blood pressure (hypertension)
    - Diabetes
    - High blood cholesterol
    - Overweight (Body Mass Index ≥ 25)/ or Obesity (Body Mass Index ≥ 30)
    - Physical inactivity (getting less than 30min exercise, at least 3 days/week)
    - Cigarette smoking
- Risk factors multiply each other's effects. Each risk factor basically doubles a person's chance of developing CHD. For instance, if you have high blood pressure and are not physically active, you are 4 times more likely to develop CHD than someone who has no risk factors. If you have three risk factors, then you are 8 times more likely to develop CHD. You get the point.
- You are likely to know if you are overweight or obese. You certainly know if you are physically inactive or smoke.
- The other risk factors are not so obvious. In order to know for certain if you have high blood pressure, diabetes, or high cholesterol, you have to get screened.
- Did you know that there are new classifications for conditions that precede high blood pressure and diabetes? They are "prehypertension" and "prediabetes."

Message Frames

Gain-framed

- Young adults who get screened for CHD risk factors, such as high blood pressure, diabetes, and high cholesterol improve their chances of detecting these warning signs in the early, more treatable stages of the disease.
- If you discover that you have some of these warning signs, and you address them early, you help to prevent long-term damage to your blood vessels and organs.
- By learning your baseline numbers for CHD risk factors you will be able to track changes that could indicate developing health problems.

Loss-framed

- Young adults who do not get screened for CHD risk factors, such as high blood pressure, diabetes, and high cholesterol decrease their chances of detecting these warning signs in the early, more treatable stages of the disease.
- If you discover that you have some of these warning signs, and you do not address them early, you will fail to prevent long-term damage to your blood vessels and organs.
- By not learning your baseline numbers for CHD risk factors you will be unable to track changes that could indicate developing health problems.

APPENDIX B

QUESTIONNAIRES AND MEASURES

Socio-demographic and Health Information

Part 1

Please write in the blank or circle the appropriate response for each item.

Please provide only one response per item.

1. Age: _____ 2. Gender: Male Female

3. Marital status: Single, never married Separated

Single, living with significant other Divorced

Married Widowed

4. Ethnic background:

Black or African American Asian or Asian-American

Caucasian/White (Non-Hispanic) Native Hawaiian or Other Pacific Islander

Hispanic or Latino(a)-American American Indian, Alaskan Native

Other (specify) _____

5. What is your country of origin? _____

6. What is your annual family income?

(If you are financially independent, this is your income. If you receive most of your financial support from someone else, this is your combined income.)

Less than $25,000 Between $75,000 and $100,000

Between $25,000 and $50,000 Greater than $100,000

Between $50,000 and $75,000

7. How many people are supported by the income indicated above? _____

8. Current classification:

Freshman	Junior	Masters student	Non-degree seeking
Sophomore	Senior	Doctoral student	

9. Highest degree obtained:

High School Diploma / GED	Bachelors	PhD
Associates/technical	Masters	

10. Please indicate your parents' highest degrees:

Mother: _____ Father: _____

11. Religious/spiritual affiliation:

Christianity	Judaism	Islam
Hinduism	Buddhism	None

Other: _____

Part 2

Please answer each of the following questions by either circling the correct answer, or filling in the blanks where provided. If you are not certain of an answer, please give your best guess.

1. What is your height?	
2. What is your weight?	
2a. Are you overweight, normal weight, or underweight?	over normal under
3. On average, how many days per week do you exercise?	
4. How would you best describe your eating habits?	healthy unhealthy
4. Do you consider yourself physically fit?	yes no
5. Do you consider yourself healthy?	yes no
6. How many times per year do you see a physician?	
7. Do you have a father or brother who was diagnosed with heart disease before age 55?	yes no
8. Do you have a mother or sister who was diagnosed with heart disease before age 65?	yes no
9. (Females) Do you take birth control medication?	yes no
10. Are you a smoker?	yes no
10a. If yes, how many years have you been a smoker?	
10b. If yes, how many cigarettes do you smoke per day?	
11. Have you ever had your blood pressure measured by a health care worker?	yes no
11a. If yes, was it high?	yes no dk*
12. Have you ever had your blood sugar (glucose) tested?	yes no

12a. If you have diabetes, is it Type I or Type II?	Type I	Type II	
13. Have you ever had your cholesterol tested?	yes	no	
3a. If yes, was it high?	yes	no	dk*

14. Do you have any biological siblings or parents with a history of the following (please indicate relation):

Heart Attack (yes / no/ dk) Relation(s): _____

Stroke (yes / no/ dk) Relation(s): _____

High cholesterol (yes / no/ dk) Relation(s): _____

Diabetes (yes / no/ dk) Relation(s): _____

Hypertension (high blood pressure) (yes / no/ dk) Relation(s): _____

Overweight/Obesity (yes / no/ dk) Relation(s): _____

* dk = Don't know.

Pamphlet Evaluation

1. Please indicate your impression of the overall tone of the pamphlet you just read by circling one of the numbers below:

Mostly Negative				Neutral				Mostly Positive
-4	-3	-2	-1	0	1	2	3	4

2. In your opinion, did the pamphlet you just read place more of an emphasis on the costs associated with not getting screened for CHD risk factors, or on the benefits associated with getting screened for CHD risk factors?

Costs				Equally Emphasized				Benefits
-4	-3	-2	-1	0	1	2	3	4

Health Beliefs

Please rate yourself on each item below by circling one number per question:

1. If you continue taking care of your body the way you are now, what do you feel is the likelihood you will eventually develop coronary heart disease?

Extremely Unlikely				Equal Chance				Extremely Likely
1	2	3	4	5	6	7	8	9

2. How worried are you about eventually developing coronary heart disease?

Not at all Worried								Extremely Worried
1	2	3	4	5	6	7	8	9

3. If you were to develop coronary heart disease, how serious of a problem do you think it would be?

Not at all Serious								Extremely Serious
1	2	3	4	5	6	7	8	9

Screening Intentions

1. If given the opportunity free of cost, how likely would you be to make an appointment sometime soon to get screened for coronary heart disease risk-factors?

Extremely Unlikely								Extremely Likely
1	2	3	4	5	6	7	8	9

2. Regardless of how you answered question #1, please provide a one-sentence answer indicating the primary reason that you would not take advantage of an opportunity for free CHD risk-factor screening.

Reminder Slip

You are invited to receive a free health screening for CHD risk factors. Only participants who have completed this study (Health Communication and Individual Differences) are eligible for the free screenings. The screenings will take place on campus within the next few weeks and will provide you with your numbers for cholesterol, blood glucose, and blood pressure.

If you are interested, sign onto Sona and look for Health Communication and Individual Differences – Part 2. The password is *cardio*. If you decide to sign up for a free screening appointment, make sure to follow the pre-screening instructions carefully. Please note that there is no extra credit for participating in the free screenings.

There are limited appointment times available. If you would like to receive a free screening, but there are no appointment times that fit your schedule, please send me an e-mail at _____.

Part 2 Pre-screening Questionnaire

1. Have you consumed any food or anything to drink other than water over the past 12 hours? _____ If "yes", please describe: _____

_____

2. Are you a smoker? _____ If "yes", when did you have your most recent cigarette?

_____

3. Have you taken any medication today, including prescription or over-the-counter? _____ If "yes", please describe: _____

_____

4. Have you taken any vitamins or herbal remedies today? _____ If "yes", please describe:

_____

_____

5. Have you exercised today? _____ If "yes", please describe: _____

_____

6. This participant is eligible / ineligible to obtain the **blood glucose and cholesterol screenings**. If ineligible, please explain: _____

_____

7. This participant is eligible / ineligible to obtain the **blood pressure screening**. If ineligible, please explain: _____

_____

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