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ROLES OF RELIGIOUS ORIENTATION AND HEALTH LOCUS OF CONTROL

IN AN AGING POPULATION

by

Jennifer A. Fallon

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ABSTRACT

Roles of Religious Orientation and Health Locus of Control

in an Aging Population

by

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An intrinsic religious orientation has been linked to improved cardiovascular health. Individuals may be protected by their beliefs against anger/hostility, which have been linked to increased cardiovascular reactivity and disease. Health locus of control differentiates between *internals*, who take responsibility for health, and *externals*, who attribute responsibility to chance or powerful others. Internal health locus of control has been linked to healthy behaviors, but its relationship to religious orientation is unclear.

Intrinsically held religious beliefs and internally held expectancies for health may, through the mechanism of reactivity, reduce risk for cardiovascular disease. This study explored relationships among health locus of control, religious orientation, and cardiovascular reactivity to an interpersonal stressor in an older adult population. Intrinsic religiousness and internal health locus of control emerged as highly related potential buffers against anger/hostility and cardiovascular reactivity.

(114 pages)

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Jennifer A. Fallon

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CHAPTER I

INTRODUCTION

As the average lifespan of those in developed nations lengthens, concern grows as to whether the increasing life expectancy will result in an improvement or a decline in health of older adults (Padula, 1997). Research efforts have accordingly been increasingly directed towards understanding factors that preserve well-being. In particular, interest in the effects of religion on health has risen dramatically (Mills, 2002). Religious beliefs, practices, and social supports have recently been rediscovered in the scientific community as potential mechanisms that may help individuals cope. And although there are indications of their effectiveness (Miller & Thoresen, 2003), considerable debate remains as to the degree of evidence supporting beneficial effects of religion/spirituality on health (Hill & Pargament, 2003; Sloan & Bagiella, 2002).

Relationships among religiousness, health, and related moderators, become more important given indications of the prevalence of religiousness in the U.S. In the 1995 Gallup poll, 96% of Americans interviewed professed a belief in God or a higher power (Powell, Shahabi, & Thoresen, 2003). Additionally, 88% of those 65 or over participating in a national telephone survey said the word "religious" accurately defined them (Koenig, 1993). Understanding the associations, both positive and negative, between religiousness and health seems particularly relevant for older adults.

Possible pathways for beneficial health effects of religiousness include cognitive and behavioral factors, as well as social support (Thoresen, 1999). Several studies have attributed a positive relationship between religiousness and health to the social benefits of

religion; for example, membership/connectedness, or the effect of volunteering (Oman, Thoresen, & McMahon, 1999). Other studies have explained how religious factors might influence health through behavioral factors, such as abstinence from alcohol (McIntosh & Spilka, 1990). In the present study, focus is on the cognitive pathway, specifically on the following concepts: religious orientation and health locus of control.

One of the most prominent conceptualizations in the study of religion is Gordon Allport's notion of religious orientation (Donahue, 1985). Allport developed concepts to distinguish between individuals who are "living" their religion (intrinsic) or "using" their religion (extrinsic; Hill & Pargament, 2003). An intrinsic (I) religious orientation has been linked to improved physical functioning, and in particular, to better cardiovascular health (Koenig, 1993; Masters, Ives, & Shearer, 1997) as compared to an extrinsic (E) religious orientation. A possible explanation for these findings is that intrinsically religious individuals have adopted the tenets of their faiths and employ them when challenged by daily stressors; for example, by practicing tolerance and forgiveness (Powell et al., 2003). Their beliefs may protect them against negative emotional states, particularly anger and hostility, which have been linked to increased cardiovascular reactivity and disease (Clark, Friedman, & Martin, 1999).

Health locus of control is another cognitive factor that may provide protection against deleterious health effects of negative emotional states. The multiple dimensions of this concept differentiate between *internals*, who attribute the majority of the responsibility for their health to themselves, and *externals,* who attribute this responsibility to some force outside themselves, such as chance or powerful others (Wallston & Wallston, 1982). An internal locus of control has been linked to positive

health behaviors and status (Wallston, 1993b). However, its relationship to religiosity is unclear; and studies of its relationship to cardiovascular disease (CVD) are unknown.

According to World Health Organization estimates, 16.6 million people around the globe die of CVD each year; and 84% of U.S. CVD deaths occur in people age 65 and older (American Heart Association, 2002a). The most common explanation for the link between protective cognitive factors and CVD is that such factors reduce the degree of cardiovascular reactivity (CVR) produced by stressful events (Gerin et al., 2000). Repeated hyper-reactive responses, such as those that highly hostile or angry individuals may experience, can lead to allostatic load and damage of the cardiovascular system (Thoresen, 1999). Intrinsically held religious beliefs and internally held expectancies for personal well-being might, through the mechanism of dampened CVR, reduce the risk for CVD.

This study was based on the following ideas: (a) anger/hostility and CVR have been linked in numerous studies to cardiovascular disease, (b) intrinsic religiousness may provide a buffer against anger/hostility and CVR, (c) an internal health locus of control may influence anger/hostility and CVR, and (d) intrinsic religiousness and internal health locus of control may individually and jointly influence health through reducing anger/hostility and CVR. Thus, the goal of the study was to better understand how religiosity may interact with health locus of control to affect psychophysiological reactivity to stress in an older population. Given the relevance of both CVD and religion to the aging U.S. population, these potential protective factors deserved investigation.

CHAPTER II

LITERATURE REVIEW

Identifying and understanding potentially protective health factors such as religious orientation and health locus of control are particularly timely and relevant for older Americans. The following review of literature explains the current practical significance of these concepts and of this study. Population trends and characteristics regarding aging, religion, and CVD are presented. Next, the major concepts and their interactions with each other are successively addressed. First, general evidence concerning the relationship between religion and health is presented. Next, religious orientation, and evidence of its effect on health is discussed. Biobehavioral factors are then presented; in particular, the possible role of hostility in producing increased levels of CVR and the development of CVD is explained. Discussion of evidence regarding the "reactivity hypothesis" follows, with special attention given to studies that have investigated religious orientation and psychophysiological reactivity. Health locus of control is described next, and studies of its relationship to health are presented. Preliminary studies integrating these three concepts (religious orientation, psychophysiological reactivity, and health locus of control) are discussed. And finally, the specific research questions of this study are stated.

Background and Significance

American Population Trends

Aging. Perhaps one of the most significant trends in America in recent decades

has been the extension of life and the resulting percentage increase in the older adult population. In 2030, the percentage of the U.S. population over 65 is expected to be 20%; this is a dramatic increase from even recent years, in which the older adult population is estimated to be 12.7% (McFadden, 1995). This change in demographics may be the major contributor to current emphases on prevention in many health disciplines, psychology included. Prevention efforts are often aimed at maintaining or enhancing well-being, which incorporates both objective life conditions and the individual's subjective evaluations of life conditions (McFadden).

There is also increasing interest in factors that simply allow "individuals to survive with the burden of disease that they do have" (Siegler, Bastian, Steffens, Boswoth, & Costa, 2002, p. 844). Contrary to expectations that only the exceptionally healthy would live to extreme old age (e.g., 100 years) population studies have shown that approximately 80% of those over 95 have some significant disability (Siegler et al.). As previously fatal diseases become conditions to be managed, such as diabetes or cancer, the percentages of disabled "oldest-old" are likely to grow. Thus, both the proportion and the characteristics of the aging population are changing.

Religion. Another significant characteristic of the American population is religious activity. Recent polls report nearly 96% of Americans believe in God or a universal spirit (McCullough, Hoyt, Larson, Koenig, & Thoresen, 2000), and it appears that religion increases in importance over the life span. National surveys have indicated that three quarters of older adult persons consider religion very important in their lives, in contrast to only 44% of people under age 30; and among women and/or ethnic minorities these rates are likely even higher (McFadden, 1995). It appears the rates may even be

increasing: in 1998, 82% of Americans expressed an interest in spiritual growth, while only 58% said the same in 1994 (Powell et al., 2003).

Religion appears to be particularly salient for older adults, perhaps reflecting the challenges presented by aging, such as searching for meaning in life, loss of independence and control, and the increasing reality of death (Wink & Dillon, 2002). Particularly for older individuals, whose participation in many other activities may wane and who often face increased health concerns, religion may play a significant role (McFadden, 1995). Weekly church attendance rates of 50% have been reported for those 65 and over despite certain disabilities in this group (Koenig, 1993). Also, almost 90% of those 60 and over agreed that spiritual beliefs were helpful in coping (Koenig). In addition to expanding knowledge of religion and aging, investigation of religion among older adults may lead to greater understanding of well-being in later life. As noted by Idler (1987), both objective and subjective evaluations of health status may be significantly influenced by religious concepts, practices, and affiliations.

Cardiovascular disease. Nearly 60 million Americans have heart or vascular disease, and nearly 1 million die from it annually (Lefkowitz & Willerson, 2001). In 2000, 6,294,000 people were discharged from short-stay hospitals with a first-listed diagnosis of CVD; of these, 64.5 % were age 65 and older (American Heart Association, 2002b). Coronary artery disease, one form CVD may take, is responsible for approximately 450,000 deaths annually. Other fatal manifestations of CVD include stroke and congestive heart failure. In 1997, heart failure accounted for almost 1 million hospital admissions, and it is the most common reason for hospitalization of those over 65 (Lefkowitz & Willerson). Hypertension, a risk factor for numerous conditions, is

estimated to affect almost 50 million Americans (Blumenthal, Sherwood, Gullette, Georgiades, & Tweedy, 2002). Clearly, cardiovascular health is a pressing concern, making possibly protective factors very important.

Religion and Health

   Background. The relationship between religion and health has fascinated many people, from philosophers to surgeons. For much of history, it was assumed that religiousness positively affected health. But earlier in this century, particularly with the rise of natural science methods and behaviorism, religion and spirituality disappeared from scientific settings (Seeman, Dubin, & Seeman, 2003). But, as previously noted, there has been a recent resurgence of interest in these topics.

   Within the field of psychology there has been considerable debate about the potential effects of this relationship. Many mental health professionals hold the belief that religion is detrimental to health (Bergin, Masters, & Richards, 1987). However, others in the field have suggested that religious behaviors and beliefs may support health (Koenig, 1991; McFadden, 1995). Recent special issues on health and spirituality/religion in two major psychological journals, *The Annals of Behavioral Medicine* and *American Psychologist,* attest to both the current prominence of this topic and the dissension that exists. In a substantive review, Koenig (2001) reported that a clear health advantage is related to religious behavior. After looking at some of the same studies, Sloan and Bagiella (2002) concluded there is insufficient evidence to support a link between religion and health when heart disease and hypertension are the endpoints. Then again, only a year later, referring to several meticulous reviews published in 2003, Hill and Pargament (2003) concluded, "it is now known that religion is linked to physical and mental health" (p. 72).

Evidence of relationship between religion and health. Recent years have seen researchers closely examining this relationship and posing many questions. In fact, disagreement about evidence for the relationship often seems to be about which specific questions are asked and whether these are truly answered (Sloan & Bagiella, 2002). Several early studies supported the salutary effect of the religion-health relationship, through correlations between religiousness and mortality rates. However, authors of many of these studies measured and conceived of religiosity differently, defining the construct as everything from religious affiliation to religious coping to religious attendance (Koenig, 1991). Although the data seemed promising, they were hard to interpret.

In a meta-analytic review of studies in which authors investigated religious involvement and mortality, McCullough and colleagues (2000) evaluated these various constructs and made comparisons across studies. Their review validated the significance of the relationship between religion and health. The authors concluded, "religious involvement is associated with higher odds of survival (or conversely, lower odds of death)" (p. 219). The importance of such findings clearly argues for further research into the relationship between religion and health. However, in their review, these authors did not identify the mechanism(s) by which religious involvement affects health status. In fact, the authors noted that in studies in which investigators exerted the greatest statistical control, the weakest relationship between religious involvement and mortality was obtained. This finding implies that other demographic, psychosocial, or health-related variables may account for much of the relationship between religious involvement and health (McCullough et al.).

In a meticulous review of nine different and specific hypotheses for the relationship between religion and health, Powell and colleagues (2003) concluded that religion could have a protective effect on health as a protective resource preventing

disease in healthy people. They also concluded there was evidence supporting a relationship between religion and cardiovascular health in particular, but suggested that this may be largely explained by the healthier lifestyle advocated by many religions (Powell et al.). Specifically, they cited frequent prayer or meditative activities, and the quieting of the sympathetic nervous system this likely promoted, as viable mechanisms for the observed relationship between religion and cardiovascular health (Powell et al.).

In another meticulous review in the same journal issue, Seeman and colleagues (2003) concluded there was reasonable evidence that religiosity was specifically associated with lower blood pressure and less hypertension. It is interesting to note that these authors restricted their review for this particular question to effects of Judeo-Christian religious practices, and placed meditation studies in a separate category (Seeman et al.), presumably in an attempt to identify which aspects of religiousness were most beneficial. In general, these authors concluded there was limited evidence for the hypothesis that religion/spirituality may be linked to physiological processes, but considerably more research was needed (Seeman et al.).

The psychophysiological mechanisms that might explain these relationships are frequently insufficiently explored in studies of religion and health (Seeman et al., 2003). In fact, many of the studies used to support the existence of the relationship were not intentionally considering religious variables; therefore, confounding variables were not controlled, calling the observations into question (Sloan & Bagiella, 2002). Investigations intentionally aimed at elucidating the relationship between religion and health have generally considered one of the following mediating variables: (a) adherence to religiously based codes of behavior (e.g., abstinence from alcohol, tobacco, and extramarital sex); (b) belief in the body as sacred and adherence to more healthful behaviors; (c) social support through religious affiliation; (d) psychological effects of participation in religious practices (e.g., rituals); (e) generalized effects of belief systems

on physical and psychological functioning (Masters, 1995; McIntosh & Spilka, 1990).

There are many, often conflicting, teachings offered by religions, which may have direct and indirect effects on health, both positive and negative. As noted by Dull and Skokan (1995), health states may be affected by religious beliefs promoting optimism or fatalistic pessimism. Similarly, while religion may foster perceptions of control, it may also remove perceptions of control, and directly affect health through prohibitions against certain treatments (Dull & Skokan). As noted earlier, moderating variables may represent several different pathways (i.e., behavioral, social, and cognitive) that may function independently or in concert (Thoresen, 1999).

Intrinsic and Extrinsic Religious Orientations

Religious belief systems, cognitions, may directly affect both physical and psychological functioning, and so present a particularly interesting way through which religion might affect health (Dull & Skokan, 1995). Religious beliefs might serve as a filter for stressful experiences, aiding in interpretation of these experiences and reducing their effects upon individuals. In this manner, religious schemata might facilitate psychological adaptation through cognitive means (Koenig, 1991).

In contrast to some of the other religious variables (e.g., church attendance) it seems that religious beliefs require some degree of sincere acceptance for them to be effective. An important aspect to consider for moderating variables in the cognitive pathway is how the religious beliefs are held, an individual's level of commitment. As described by Hill and Pargament (2003), "To the devout, religion and spirituality are not a set of beliefs and practices divorced from everyday life...instead, religion and spirituality are ways of life to be sought, experienced, and sustained consistently" (p. 68). Thus, how an individual conceives of his or her religion, whether it is "lived," is an important distinction.

This distinction is represented by an important and respected concept in the scientific study of religion, religious orientation. As defined by Allport and Ross (1967), the I and E orientations represent different ways of being religious, specifically, different motivations for religiousness. Several aspects of religiousness are combined to make this assessment, including a pervasive versus compartmentalized role for religion, church attendance versus nonattendance, and a master motive versus instrumental conceptualization of religion (Donahue, 1985). The intrinsically religious individual finds religion inherently worthwhile, integrates it throughout his/her life, and internalizes the beliefs. In contrast, the extrinsically religious individual considers religion instrumental in achieving an end such as sociability, security, or status (Bergin et al., 1987).

This dimension has been investigated and refined over the years, so that now I and E are no longer considered polar opposites. Early research findings showed many individuals endorsing elements of both I and E. This led to the development of two more types: those individuals who endorse both I and E are termed indiscriminately proreligious; those endorsing neither I nor E items are termed indiscriminately nonreligious. The addition of these types has facilitated refinement of the original construct. The term "intrinsic" has come to mean those who endorse I items and do not endorse E items; "extrinsic" has come to mean those who endorse many E items and do not endorse many I items. The categories of I and E now more accurately reflect distinct forms of religiousness.

Religious Orientation and Health

There has been substantial investigation into the relationships among I and E orientations and mental health. Generally, I has been associated with healthy functioning, while E correlates with poor functioning (Donahue, 1985). I has been

negatively associated with depression, anxiety, and isolating social behavior (Payne, Bergin, Bielema, & Jenkins, 1991). Correlations among positive traits such as empathy, tolerance, self-control, and responsibility have further supported the I - E distinction ($r = .44 - .29$; Bergin et al., 1987). While I has been positively associated with these indicators of good psychological functioning, E has been negatively associated with them (Bergin et al.; Donahue; Masters & Bergin, 1992).

Despite these findings, there has been relatively little research into the relationships I and E may have with physical functioning. The few pertinent studies are presented below in the discussion of cardiovascular reactivity and religious orientation.

<div align="center">Cardiovascular Disease: The Roles of

Reactivity and Hostility</div>

In a recent research review Lefkowitz and Willerson concluded, "CVD remains the greatest threat to life and health in humans" (2001, p. 587). As previously noted, CVD encompasses several serious diseases, including but not limited to, coronary heart disease (CHD), chronic heart failure, hypertension (HTN), and coronary artery disease (CAD). Many studies of biobehavioral factors have looked at these different diseases as separate endpoints despite similarities in etiology (e.g., atherosclerosis) and risk factors such as tobacco use and obesity. Studies investigating these different diseases as endpoints will be presented, as they offer information relevant to this discussion of psychophysiological reactivity as a mechanism in the development of CVD.

Anger/hostility and psychophysiological reactivity have been linked in numerous studies to CAD and CHD (Smith & Ruiz, 2002). The "reactivity hypothesis" is an explanation of the interaction of these variables and their ultimate effect on cardiovascular health. In this hypothesis, hostility is conceptualized as a direct risk

factor, while reactivity offers an explanation of the physiological mechanism(s) through which hostility affects CVD.

Reactivity

The recurrent activation hypothesis, or reactivity, is a proposed explanation for the physiological mechanisms through which hostility might operate to affect CVD. Reactivity is assessed through observing acute changes in sympathetic nervous system functioning; for example, in heart rate (HR) and blood pressure (BP). These changes, and the related cardiovascular changes (e.g., increased cardiac output and peripheral resistance) may initiate and accelerate the progression of CAD (Smith & Ruiz, 2002), and presumably, of related cardiovascular conditions. This process has also been described in terms of allostatic load, the process by which chronic stress results in a reduction of the body's ability to respond and recover (Thoresen, 1999).

The reactivity hypothesis has generally been supported in research investigations. In the seminal review on this topic, Krantz and Manuck (1984) concluded that psychophysiologic responsiveness, reactivity, to stress might be a marker of processes involved in the development of CVD. Additionally, findings from predictive and epidemiological studies indicated that high levels of reactivity might be linked to disease later in life (Adler & Matthews, 1994; Matthews, Manuck, & Saab, 1986). And others have recently reported cardiovascular reactions to mental stress tests were associated with a variety of disease endpoints, such as hypertension and carotid atherosclerosis (Steptoe, Cropley, & Joekes, 2000).

Animal studies provide converging evidence regarding effects of increased CVR (Smith & Ruiz, 2002). In female monkeys, associations have been shown between severity of CAD and magnitude of stress-induced increases in HR (Manuck, Kaplan, Adams, & Clarkson, 1989). In rats, even a mild psychological stressor related to

avoidance was associated with marked alteration in heart rate and occasional arrhythmias (Nyakas, Alingh Prins, & Bohus, 1990).

However, even now, nearly 20 years after the Krantz and Manuck review, the relationship is still not perfectly understood. As these authors (1984) reported,

> reactivity has been implicated either as a direct contributing factor to disease and/or a marker of correlated pathogenic processes...others view it as precipitating factor for clinical symptoms, and still others suggest that cardiovascular and endocrine reactivity may have both pre-clinical and clinical pathogenic effects. (p. 436)

The exact point at which reactivity enters the pathogenic process is still unclear. Smith and Ruiz (2002) noted that associations between psychosocial risk factors and CHD endpoints could reflect an effect on initial stages, pace of progression, or even triggers among those with related conditions. However, it was clear that regularly high levels of physiological reactivity were associated with CVD (Ruskin, 1996). And the reactivity hypothesis, including the role of psychosocial risk factors such as hostility, has been supported in numerous studies (Smith & Ruiz). The original conception, of a hypertensive state triggered by increased cardiovascular responses to stressful events, seemed a viable explanation of observed associations between reactivity and various stages of CVD (Krantz & Manuck; Ruskin; Steptoe et al., 2000).

Since its inception, the reactivity hypothesis has been refined in some important aspects. As outlined in a recent review of the cardiovascular reactivity literature, there have been four major models of the reactivity hypothesis (Gerin et al., 2000). Two models are prevalent today. In the first, reactivity is considered an individual difference variable (Smith & Ruiz, 2002). Studies using this model attribute reactivity to the person, and would expect an individual's reactivity levels to be consistent (Gerin et al.). In the second model, reactivity is attributed to an interaction between a person and a situation (Gerin et al.). Reactivity is considered a mechanism that mediates psychosocial

risk factors, such as hostility (Smith & Ruiz). With this model, an individual's reactivity levels are expected to vary with situational factors, yet dispositional factors are still reflected. This model guided the present study.

Measurement of reactivity. Although acute cardiac events are possible from a single extreme stressor, the reactivity hypothesis generally relies on an underlying assumption that observed changes in cardiovascular functioning occur frequently and are characteristic of individuals. If so, accurate measurement of physiological changes, particularly HR and BP, in response to real-life or laboratory-induced psychological challenges may allow detection of potentially pathogenic states, such as "hyper-reactivity" (Krantz & Manuck, 1984). However, generalization to characteristic levels of reactivity from laboratory sessions is quite difficult (Gerin et al., 2000). Individual variability to a given stressor, and the relevance of lab stressors to daily life are both measurement problems. Individual variability argues for inclusion of multiple tasks and careful selection of these tasks in reactivity studies (Steptoe et al., 2000).

However, many studies include only stressors utilizing cognitive and physical challenges, such as mental arithmetic and cold pressor, respectively. The utility of these stressors in providing accurate representations of nonlaboratory responses is limited; stressors of these types have shown little relationship, or correlation, with responses to interpersonal stressors (Matthews et al., 1986). Interpersonal stressors are the principal stressors experienced by most individuals (Bolger, DeLongis, Kessler, & Schilling, 1989). As Steptoe and colleagues concluded, "mental stress testing is not, therefore, a proxy for cardiovascular activity during 'real life'" (Steptoe et al., 2000, p. 52). Findings from epidemiological studies have also shown that interpersonal stressors are the strongest psychosocial risk factors for health outcomes (Adler & Matthews, 1994). Finally, the hypothesis of this study proposes that religiosity will differentially affect

responses to only interpersonal stressors, as religious teachings are more relevant and applicable to challenges of this sort.

In a meta-analytic review of recent CVR studies, Swain and Suls (1996) offered some recommendations to increase reliability of reactivity measurements. As noted, it is the presumed frequency and consistency of observed changes in HR and BP that could make hyper-reactivity pathogenic; thus, the reliability of reactivity measurements across time is important. Findings from the Swain and Suls' review supported the use of cognitive/behavioral stressors in reactivity studies, as these types of tasks had greater reproducibility. Also, the authors recommended the uniformity of speech tasks for all participants, so that speech demands did not confound the HR and BP ratings observed.

The type and degree of reactivity in question also affects task or stressor selection. In their study of age, sex, type A, and reactivity, Harbin and Blumenthal (1985) recommended careful selection of tasks, and suggested "competition or stressful personal interaction" as likely to produce more pronounced response differences than other tasks. Interaction stressors, and most cognitive/behavioral stressors, were considered active tasks, because they required engagement and response from the participant. Responses seemed to be highest in active tasks, perhaps indicating that sympathetic nervous system influences were greatest in these activities (Krantz & Manuck, 1984). A common active task in many reactivity studies is mental arithmetic. Mental arithmetic has been shown to elicit increased levels of HR and systolic BP. This pattern, of increased systolic BP and HR, but not necessarily increased diastolic BP, indicates strong beta-adrenergic influences on the heart (Krantz & Manuck). These authors concluded that active coping tasks may be of particular relevance to cardiovascular disorders (Krantz & Manuck).

Reactivity and religiosity. At least 15 years ago, researchers were reporting that high religiosity, whether based on attendance or self-rating, was associated with lower BP. Unfortunately, studies at that point lacked sufficient controls to allow generalization

(Levin & Schiller, 1987). For example, several of these studies were largely comparisons of denominations, and differences in BP could be explained by the different health behaviors of these denominations (Levin & Schiller; Sloan & Bagiella, 2002).

More recently, Levin and Vanderpool (1991) reported that religious commitment exerted a strong protective effect on BP, particularly in devout groups (e.g., Mormons) though they noted there were many explanatory factors, including health-related behaviors and heredity. Koenig (1993) reported lower levels of intrinsic religiosity in hypertensive men than in nonhypertensives (Z = 1.75). These results strengthened findings from an earlier study in which Koenig noted the importance of religion was more strongly associated with lower diastolic BP, than was church attendance (Koenig, 1991).

A recent study of levels of spirituality is intriguing for its beneficial observations regarding CVD. In a follow-up study with patients from Dr. Dean Ornish's Lifestyle Heart Trial, Morris (2001) found scores on a spirituality measure were statistically significantly correlated with a reduction in percent stenosis (r = -.459). However, this study was weakened by its small sample size (i.e., 14 participants). Additionally, it is important to note that this study investigated recovery, not prevention of illness; and that, while similar, level of spirituality and type of religious orientation were not identical (Underwood & Teresi, 2002).

Hostility

Given that high levels of reactivity appear to correlate with CVD, what contributes to reactivity, and hyper-reactivity in particular? Krantz and Manuck (1984) suggested that for a given stressor, hyper-reactivity may be determined by a variety of individual characteristics such as hereditary factors, psychosocial forces, or some interaction of these. Specifically, they noted that some of these factors may be related to

or independent of the Type A construct (e.g., hostility). Findings from recent studies have bolstered the link between hostility and reactivity, offering a viable explanation for the effects of hostility on CVD (Smith & Allred, 1989). For example, increased anger was significantly related ($p = .009$) to greater cardiovascular changes in a group of 26 "high hostile" young men (Suarez & Williams, 1989).

Hostility and cardiovascular disease. Hostility appears to be the significant component of Type A behavior in terms of CVD risk. In reexamination of data from earlier studies that implicated Type A as a risk factor for CVD, only hostility emerged as a significant independent predictor for heart disease (Hecker, Chesney, Black, & Frautschi, 1988). Similar conclusions were reached upon reexamination of the Multiple Risk-Factor Intervention Trial (MR-FIT) participants. Dembroski, MacDougall, Costa, and Grandits (1989) found that only MR-FIT hostility ratings were associated with subsequent heart disease, not any other aspect of Type A behavior nor cumulative Type A ratings. In another meta-analytic review, hostility was deemed a reliable predictor of CHD and atherosclerosis, $r = .171$ and .117, respectively (Booth-Kewley & Friedman, 1987). In a follow-up review, Matthews (1988) considered the same studies taking number of study participants into account; hostility was again considered a reliable predictor of CHD. The role of hostility, and chronic anger, as independent risk factors in the development of CVD is further supported by a meta-analytic review of 45 prospective and cross-sectional studies (Miller, Smith, Turner, Guijarro, & Hallet, 1994).

Hostility and religiosity. There has been little research into the relationships among religious orientations and hostility. Thus, the possibility of a mediating effect on hostility, and physical manifestations of it, has not been well-explored. Masters and colleagues (1997) reported low hostility ratings and intrinsic orientations were associated in a sample of Type A college students. High hostility was also related to a proreligious orientation (endorsement of both I and E items) in another study of college students by

the same researchers (Masters et al.). These studies offered support to the hypothesis suggested by Williams (1989), that types of religiosity may mitigate the negative effects of hostility in Type A individuals. Internalization of religious tenets concerning service to others, hope, kindness, and trust, may lead individuals to perceive of and respond to stressful events in a healthier, less hostile manner.

Health Locus of Control

Another individual characteristic affecting health behaviors, and thereby overall health status, is belief about health and responsibility for one's health. This concept has been studied as health locus of control (HLC) since the 1970s (Furnham & Steele, 1993). HLC is a domain specific application of concepts originally derived from Rotter's locus of control theory (McIntosh & Spilka, 1990). Locus of control refers to individuals' beliefs regarding the degree to which they are able to influence an outcome (Furnham & Steele).

The HLC concept reflects where, or to whom, responsibility for personal health is attributed. The construct is divided in two dimensions, *internal* and *external*; the external dimension contains two subcategories, powerful others and chance. In many studies, an internal HLC has been correlated, $r = .40$, to more healthful behaviors and better health status, while an external HLC negatively correlates to health status, $r = -.28$ (Furnham & Steele, 1993; see also, Frazier & Waid, 1999; Wallston, 1993b). For example, in a study of 112 Appalachian adolescents, smokers were less likely to have an internal HLC, $p < .001$, $d = .93$ (Booth-Butterfield, Anderson & Booth-Butterfield, 2000). In this study, smokers were also more likely to perceive their health as controlled by chance factors, $p < .001$, $d = .65$.

Among older adults, an internal HLC has been negatively correlated with anxiety, $r = -.26$, $p < .01$ (Frazier & Waid, 1999). In the same study, both external dimensions,

chance and powerful others, were positively correlated with anxiety, $r = .32, p < .002$, and $r = .32, p < .001$, respectively. Also of note, a classroom based "mind-body wellness intervention" for 120 older adults with chronic illnesses resulted in changes in both pain reports ($p < .05$) and external HLC scores ($p < .01$) on the powerful others and chance scales (Rybarczyk, DeMarco, DeLaCruz, Lapidos, & Fortner, 2001). This finding suggested a negative relationship may exist between external HLC and health among older adults.

However, other factors may confound these findings, such as value orientation, age, or health status (Masters, 1995). In a small but interesting study with 10 women at risk for CVD, a meditation intervention significantly reduced anxiety ($p < .01$), but no changes were noted in HLC scores (Tacon, McComb, Caldera, & Randolph, 2003). This finding seemed to suggest HLC was not related to a reduction of anxiety, in contrast to earlier findings (Frazier & Waid, 1999). Conflicting findings may reflect a complex relationship between these variables, and call for further investigation. In summary, with regard to older adults, there is currently little clarity and limited published data on the possible relationships between HLC and health, particularly concerning CVD or reactivity.

Multidimensional Health Locus of Control

The measure most frequently used to assess HLC is the Multidimensional Health Locus of Control Scales (MHLC) developed by Wallston, Wallston, and DeVelliss (1978) and revised by Wallston and Wallston in 1982 (Furnham & Steele, 1993). As previously noted, this measure assesses both internal and external dimensions, with the latter including both chance and powerful others. An individual who believes his doctor is in complete control of his health reflects an external, powerful others health locus of control. It should be noted that internality versus externality does not represent a true

dichotomy, as individuals can endorse items on both dimensions (Wallston, 1993a). It is possible to endorse many items on some subscales of externality (e.g., powerful others control) and yet also endorse many items on the internality scale. Therefore, *internal* should be used to describe individuals both high on internality and low on externality; similarly, *external* should describe individuals high on externality and low on internality (Wallston, 1993a). This will be the approach used in this study.

It should be noted that a new subscale of externality, the God health locus of health control (GHLC) subscale, was recently added to the MHLC (Wallston et al., 1999). The purpose of this scale was to examine how belief in God as a locus of control interacted with other health beliefs and health outcomes. However, at this point, the God subscale has not been clearly conceptualized as representing the internal or external dimension. Therefore, scores on this scale will not be used in determination of internality versus externality in this study.

Health Locus of Control and Religiosity

HLC beliefs may reflect religious beliefs and vice versa. Levin and Schiller (1986) noted that an intervention in self-skills increased the degree of internality among religiously affiliated participants but not in the unaffiliated. This attests to an interaction between HLC and religiosity, but research has been limited, and the findings do not clearly converge. Although an internal HLC seems well suited to an intrinsic orientation, some results have been surprising. Some data reflect a link between intrinsic religiosity and an external HLC in which intrinsic religiosity may be combined with the belief that God, rather than the individual, is responsible for one's health (Masters & DeBerard, 2001; McIntosh & Spilka, 1990). In this interaction, an external HLC could plausibly mitigate the positive health effects of an intrinsic religious orientation.

In a recent study with college students, GHLC scores were compared to internal (active) or external (passive) HLC scores. They found a significant ($p < .001$) relationship between endorsement of the GHLC and endorsement of an external (or passive) HLC for 60 participants (Masters & DeBerard, 2001). These preliminary findings warrant further investigation of the relationship between attributing one's health to God and taking a passive stance towards health behaviors. Attributing responsibility for one's health to others may mitigate the salutary effects of an intrinsic religious orientation on health status (McIntosh & Spilka, 1990; Wallston, 1997). Additionally, an internal HLC may increase the salutary effects on psychophysiological reactivity, and thereby on health, of an extrinsic religious orientation. However, whether this correlation between HLC and religious orientation exists in an older population is unknown.

Preliminary Studies

Findings from a very recent pilot study supported the statements made above and the first hypothesis of this investigation. The effects of religiously based beliefs were found to consistently correlate with reactivity responses in a college sample of intrinsic and extrinsic individuals (Masters, Hill, & Kircher, 2001). Faced with an interpersonal stressor, I individuals demonstrated less reactivity than E individuals on dependent variables (e.g., HR, systolic BP, diastolic BP, and current anger rating). Additionally, on four scales from the State-Trait Anger Expression Inventory-2 (STAXI-2; Speilberger, 1999) I individuals also reported less hostility than E individuals. These scales were total state anger, feeling angry, feel like expressing anger physically, and feel like expressing anger verbally. I/E differences were significant ($p < .001$) for the interpersonal stressor only, not for the cognitive stressor used in this experiment. These findings suggested that

an I orientation may contribute significantly to less reactive responses to an interpersonal stressor than is seen with an E orientation (Masters, Hill, & Kircher).

Summary and Conclusion

There is an important relationship among hostility, reactivity, and disease. Though the data are not conclusive, there is sufficient evidence to conclude the following: (a) hyper-reactivity is a plausible mechanism by which hostility affects cardiovascular disease (CVD), (b) there is evidence of reactivity responses resulting in increased cardiovascular changes that could lead to CVD, and (c) these hyper-reactive responses are more likely in those individuals who are hostile than in individuals who are not. This relationship is particularly significant in light of the prevalence of CVD. Additionally, although the physical pathway has not been mapped in detail at this point, BP and HR are reliable indicators of this hyper-reactive response. Thus, investigation of hostility and reactivity, as represented by increases in BP and HR, is important in further understanding and preventing cardiovascular disease.

It is also clear that religion is an important factor to consider in investigations of well-being. Though, again, the exact mechanisms through which religion operates have not been identified, there are strong correlations between certain types of religiosity and healthful behaviors/practices. Specifically, I orientations have been linked to better health behaviors/practices and better health status. One way in which religion might affect health is through the effects of religiously based beliefs and motivations on psychological and physical functioning. The use of intrinsically held religious beliefs to moderate reactivity and hostility in a challenging interpersonal situation could demonstrate this pathway between religion and health. No studies were located in which this relationship was studied in an older adult sample, though epidemiological findings indicated that religion was often very important to older adults (Powell et al., 2003).

Investigation of the possible moderating effects of religious orientation in an older adult sample could be informative of this pathway between religion and health.

Additionally, the degree of responsibility that one takes for one's health has been correlated to health status. Specifically, an internal HLC has been related to better health behaviors/practices and better health status in young and older adults (Masters & DeBerard, 2001; Padula, 1997). An internal HLC is believed to operate by encouraging a sense of control and active coping (McIntosh & Spilka, 1990). However, no studies were found investigating HLC and CVR with older adults. At this point, whether HLC may function as a moderator of psychophysiological reactivity to an interpersonal stressor in an older adult population is not clear.

Finally, there are very limited data concerning the relationship between religiosity and health locus of control. No studies were found in which the effect of the interaction between religious orientation and HLC on CVR was explored. It is not clear how some types of religiosity might impact, or be impacted by, HLC. Some highly intrinsically religious individuals might attribute responsibility for their health to God, an external HLC (Masters & DeBerard, 2001). Although, an external HLC is generally associated with poorer health behaviors, this association is not clear among an older population. Therefore, HLC could greatly mitigate the effects of religious orientation on health status in an older population.

Purpose and Objectives

The aim of the present study was to examine the effects of psychophysiological reactivity to an interpersonal stressor in an older adult population, as related to religious orientation and HLC. Participants were screened for participation by religious

orientation, while HLC was assessed secondarily. Based on the literature, it was hypothesized that both religious orientation and HLC and their interaction would affect responses to the stressor. An I religious orientation was predicted to be associated with less reactivity, as was an internal HLC. An E religious orientation was predicted to be associated with greater reactivity, as was an external HLC. HLC was hypothesized to vary somewhat by religious orientation, although this relationship could not be clearly predicted from the literature review. Finally, religious orientation and HLC were expected to jointly moderate reactivity levels, although the direction of the effect could not be predicted from the literature review.

Research Questions Addressed

The specific research questions addressed in the present study were as follows:

1. Is there a differential effect of religious orientation on psychophysiological reactivity to an interpersonal stressor in an older adult population?

2. Are internal and external HLC differentially correlated with psychophysiological reactivity to an interpersonal stressor in an older adult population?

3. Do intrinsically and extrinsically religious older adults differ on internal and external HLC scores?

4. What is the interactive effect of religious orientation and HLC on psychophysiological reactivity in older adults?

CHAPTER III

METHODS

Participants

Seventy-five older adults with no history of or treatment for CVD within the last 5 years and who did not indicate significant symptoms of depression or dementia were recruited for participation in the study. The participants were involved in a larger study, under the direction of Kevin Masters, Ph.D., and funded by the National Institute of Aging. Various forms of contact were utilized to recruit these individuals, including print media directed towards older adults, visits to churches, and presentations at senior citizens organizations in both the Cache Valley and Greater Salt Lake City areas. To reach a large number of older Cache Valley residents, participants of another Utah State University research group, the Cache County Study on Memory and Aging, under the direction of Maria Norton, Ph.D., and JoAnn Tschanz, Ph.D., were also targeted via a letter introducing the study.

Individuals responding to these announcements were mailed a packet of questionnaires including a preliminary demographic sheet inquiring about age, sex, and health; a brief consent form (Appendix A); a copy of the Religious Orientation Survey (ROS; Allport & Ross, 1967; Appendix B); a copy of the Geriatric Depression Scale (Short Form, GDS; Yesavage et al., 1983; Appendix C); and a self-addressed, postage-paid return envelope. They were asked to complete and return these measures. Those participants meeting requirements (see Screening section) were invited to the lab and were offered $30 compensation for their time and participation in the study. Upon arrival

at the lab participants completed the informed consent form, additional demographic questions, and a cognitive screening phase to rule out dementia. Those not qualifying were thanked for their time and paid $30. Those passing through all screening phases began participation in the study at this point.

The full sample consisted of 36 females and 39 males, was predominantly Caucasian (95%), and reported Church of Jesus Christ of Latter-day Saints (LDS) religious affiliation (42.7%). Mean age of the sample was 71.6 years. A majority of participants were currently married (73.3%), and the most common level of education included some graduate study (38.7%). See Table 1 for further demographic data.

Differences on demographic characteristics between I and E groups were investigated, and are presented in Table 2. For responses to the question *"How often do you drink alcohol per week?"* the observed difference between means was both statistically significant at the .05 level, $t(73) = -2.42$, $p = .018$, and of a medium effect size, *ES* =.57. Typically, a medium effect size "is one that is readily apparent to the researcher" (Stevens, 1999, p. 125), and is around .50. Confidence levels (95%) were -2.19 to -.218. On this characteristic, E individuals reported drinking more often ($M = 2.10$, $SD = 2.32$) than did I individuals ($M = .899$, $SD = 1.95$).

Mean differences in age also achieved statistical significance, $t(73) = -2.09$, $p = .04$. Confidence levels (95%) were -5.64 to -.138. However, the mean age reported by E individuals ($M = 73.08$, $SD = 5.98$) was only 3 years higher ($d = .48$) than that reported by I individuals ($M = 70.20$, $SD = 1.95$). Despite achieving statistical significance, this difference is not practically relevant at this age level.

Table 1

Summary of Demographic Characteristics for Full Sample

Demographic characteristics	Frequency	Percent
Religious orientation scale		
Intrinsic	37	49.3
Extrinsic	38	50.7
Gender		
Female	36	48.0
Male	39	52.0
Age in (years)		
Mean	71.63	--
Standard Deviation (SD)	6.11	--
Range	60.00 – 88.00	--
Ethnicity		
Caucasian	71	94.7
Hispanic-American	1	1.3
Not declared	3	4.0
Religious affiliation		
LDS	32	42.7
Catholic	5	6.7
Protestant/Christian	17	22.7
Jewish	12	16.0
None	4	5.3
Not declared	5	6.7
Marital status		
Single	0	- -
Married	55	73.3
Divorced	5	6.7
Widowed	8	10.7
Not declared	7	9.3
Highest education level		
High school graduate	10	13.3
Some college	17	22.7
2-year degree	4	5.3
4-year degree	12	16.0
Graduate study	29	38.7
Not declared	3	4.0

(*table continues*)

Demographic characteristics	Frequency	Percent
Social contacts		
Inadequate	1	1.3
Adequate	53	70.7
Optimal	19	25.3
Not declared	2	2.7
Work		
Yes	13	17.3
No	59	78.7
Not declared	3	4.0
Retired		
Yes	63	84.0
No	10	13.3
Not declared	2	2.7
Cigarette pack years		
.00	64	85.3
3.00	1	1.3
14.00	1	1.3
40.00	1	1.3
Not declared	8	10.7
How often drink alcohol/ week		
Mean	1.51	--
SD	2.21	--
Range	.00 – 7.00	--

Screening and Independent Variable Measures

Religious Orientation Scale

The ROS (Allport & Ross, 1967) was developed to measure and differentiate between I and E religious orientations. The measure consists of 20 items divided between the two scales, I and E. Despite some concerns regarding its limited psychometric data (Kirkpatrick, 1989), the ROS is the most widely used measure for assessing the construct of religious orientation (Masters & Bergin, 1992). After an

Table 2

Demographic Characteristics for Intrinsic and Extrinsic Religious Orientation Groups

Demographic characteristics		Group		
		Intrinsic (*n* = 37)		Extrinsic (*n* = 38)
Gender	Female	18 (48.6%)	Female	18 (47.4%)
	Male	19 (51.4%)	Male	20 (52.6%)
Age in (years)[a]	Mean	70.20	Mean	73.08
	SD	5.98	*SD*	5.98
Ethnicity	Caucasian	36 (97.3%)	Caucasian	35 (92.1%)
	Hispanic-American	0 --	Hispanic-American	1 (2.6%)
Religious affiliation	LDS	27 (73.0%)	LDS	5 (13.2%)
	Catholic	2 (5.4%)	Catholic	3 (7.9)%
	Protestant/Christian	8 (21.6%)	Protestant/Christian	9 (23.7%)
	Jewish	0	Jewish	12 (31.6%)
	None	0	None	4 (10.5%)
Marital status	Single	0	Single	0
	Married	29 (78.4%)	Married	26 (68.4%)
	Divorced	3 (8.1%)	Divorced	3 (7.9%)
	Widowed	1 (2.7%)	Widowed	7 (18.4%)
Highest education level	High school graduate	3 (8.1%)	High school graduate	7 (18.4%)
	Some college	11 (29.7%)	Some college	6 (15.8%)
	2-year degree	2 (5.4%)	2-year degree	2 (5.3%)
	4-year degree	4 (10.8%)	4-year degree	8 (21.1%)
	Graduate study	16 (43.2%)	Graduate study	13 (34.2%)
Social contacts	Inadequate	1 (2.7%)	Inadequate	0
	Adequate	24 (64.9%)	Adequate	29 (76.3%)
	Optimal	11 (29.7%)	Optimal	8 (21.1%)
Work	Yes	8 (21.6%)	Yes	5 (13.2%)
	No	28 (75.7%)	No	31 (81.6%)
Retired	Yes	29 (78.4%)	Yes	34 (89.5%)
	No	7 (18.9%)	No	3 (7.9%)
Cigarette pack years	.00	33 (89.2%)	.00	31 (81.6%)
	3.00	0	3.00	1 (2.6%)
	14.00	0	14.00	1 (2.6%)
	40.00	1 (2.7%)	40.00	0
How often drink alcohol/week[b]	Mean	.90	Mean	2.10
	SD	1.95	*SD*	2.32

[a]Differences between group means achieved statistical significance (p < .05). See text for specific values.
[b] 26 Intrinsics reported no drinking. 9 Extrinsics reported no drinking.

extensive meta-analysis, Donahue (1985) concluded that I religiousness is an excellent

measure of religious commitment. And the I and E dimensions are considered useful in

assessing ways of being religious (Bergin et al., 1987). Further, research has established

the ROS' relation with important measures of mental health, such as reduced levels of

anxiety (Koenig, 1991). As recommended by Donahue, those scoring above 27 on the I

scale and below 33 on the E scale qualified as intrinsically religious, while those scoring

below 27 on the I scale and above 33 on the E scale qualified as extrinsically religious.

Geriatric Depression Scale

The GDS (Sheikh & Yesavage, 1986) is a brief, 15-item version of the original

30-item self-report measure (Yesavage et al., 1983). The GDS was designed and

specifically tailored for use as a depression screen in older adult populations, and has

been used in numerous studies (Yesavage et al.). It has been found to differentiate

depressed from nondepressed subjects, even in populations suffering from physical

illness and dementia (Yesavage, 1986). In a review of depression measures and their use

with older adults, Yesavage reported high correlation ($r = .82$) between the GDS and the

diagnostic criteria for major depressive disorder. The short form consists of those items

most highly correlated with depression, and shows excellent test-retest reliability, alpha

=.90 (Mui, 1996). To ensure a nondepressed population, those scoring over 5 on the

GDS were excluded from participation in the present study, which is well below

recommended clinical cutoff scores of 11 (Yesavage).

Mini-Mental State Exam

The Folstein Mini-Mental State Examination (MMSE; Folstein, Folstein, &

McHugh, 1975; Appendix D) was used to screen for cognitive impairment. This brief, 10-item, measure, assesses functioning in the following areas: orientation, registration, attention, calculation, recall, language, spontaneous sentence generation, copying a complex polygon, and the ability to follow simple verbal and written commands (Folstein et al., 1975; Tinkelberg et al., 1990). Reliability coefficients of .98 were reported by Folstein et al., and recent research findings have supported the use of the MMSE as a screen for cognitive impairment (Hill & Backman, 1995). Scores of 24 or higher were required for participation in the current study since earlier research has shown many individuals with scores below 25 may be in an early phase of dementia (Hill & Backman). In her recent review, Gorman (2002) cited high sensitivity and specificity for the MMSE, 86% and 92%, respectively, when cutoffs of 23-24/30 were used.

Multidimensional Health Locus of Control

The Multidimensional Health Locus of Control Scales (MHLC; Wallston et al., 1978; Wallston & Wallston, 1982; Appendix E) were developed to investigate degree and locus of responsibility for one's health and well-being. This 24-item measure assesses an individual's attributions of responsibility for his/her health. It includes two dimensions, internal and external; within the external dimension there are two scales, powerful others and chance. Research has shown the MHLC to have good internal consistency, alpha = .87 to .82 (Marshall, Collins, & Crooks, 1990); and reliability coefficients for the internal and external scales have ranged from .80 to .62 (Frazier & Waid, 1999; Wallston & Wallston, 1981). A fourth scale, the GHLC scale, was recently added (Wallston et al., 1999), but as discussed previously, it was not used in this study because validation data

were insufficient. At this point, the GHLC has not been clearly conceptualized as representing an internal or external dimension, though it seems primarily external.

For the present study, clearly delineated dimensions were desired to facilitate understanding of the major concepts. To further clarify these concepts, the internal and external scales were combined into one unidimensional scale through reverse scoring of the internal items. Thus, highly internal individuals scored at the lower end of the spectrum, while highly external individuals scored at the high end. Because this unidimensional scale was created for the purposes of this study, no existing reliability data are available; however, it is in keeping with the dimensions of internal and external that have been verified in numerous studies (Marshall et al., 1990; Wallston et al., 1999).

Dependent Measures

The following measures were used as dependent measures of reactivity and will be discussed independently.

Physiological Measures

Physiological recording of HR, as well as systolic blood pressure (SBP) and diastolic blood pressure (DBP), was monitored during the baseline and experimental periods using a procedure adapted from Smith and Allred (1989). Briefly, a 2300 Finapres portable blood pressure monitor was employed to assess both HR and BP. The Finapres is a continuous measure of HR, SBP, and DBP. Previous studies using the Finapres have reported its relationship with related measures, such as interarterial blood pressure (Smith & Allred). Also, its measurements have been found reliable and valid in several studies (Gerin, Pieper, Marchese, & Pickering, 1993; Podlesny & Kircher, 1999).

Similar procedures for assessing HR, SBP, and DBP have been used in numerous studies as indications of reactivity (Gallo, 1998; Kohler, Fricke, Ritz, & Scherbaum, 1997; Suarez & Williams, 1989). And high levels of reliability for these variables have been reported (e.g., test-retest reliability = .79 for SBP; Jennings et al., 1997).

The Finapres finger cuff was attached to the middle phalanx of the middle finger of the nondominant hand. Baseline physiological functioning was determined by taking readings every 15-s and extracting three 60-s segments of HR, SBP, and DBP from the last 3-min of the baseline period (before introduction of the stressor). Data from the baseline period were averaged to produce a single mean level for each measure. Experimental reactivity during the interpersonal stressor was assessed in the same manner. Again, three 60-s segments of HR and BP during the interpersonal stressor task were averaged to produce a single mean level of stressor HR and BP.

Self-report Measures

State Trait Anger Expression Inventory. Two measures of subjectively experienced anger were used: the State Anger scale of the State Trait Anger Expression Inventory (STAXI-2; Speilberger, Jacobs, Russell, & Crane, 1983; Speilberger et al., 1985; Appendix F) and the Visual Analogue Scale of Anger (VAS; Blumenthal et al., 1995; Appendix G). The STAXI-2 is a new and expanded version of the previous and often used inventory. The State Anger scale was designed to assess the intensity and experience of anger as an emotional state at a particular point in time. It consists of 15 items answered on a 4-point scale, yielding scores ranging from 15 to 60. The scale was normed on over 1,900 individuals and has norms for older adults. Research has shown the STAXI-2 to be a valid measure of hostility and anger, as it has been correlated with

other anger scales, notably the Buss-Durkee Hostility Inventory, and the Hostility and

Overt Hostility scales of the Minnesota Multiphasic Personality Inventory (Speilberger

Speilberger, 1999). Additionally, the STAXI-2 has shown high internal consistency (e.g.,

.94 to .92; Speilberger). The STAXI-2 State Anger Scale was administered four times

during the experiment (i.e., following the two baselines and following the two reactivity

manipulations).

Visual Analogue Scale of Anger. The VAS was used to measure the participant's

current level of anger. It also was administered four times, twice during the baseline

periods, as well as during the two experimental reactivity conditions. This scale involves

marking a point on a line of 100 mm in length with anchors of "not angry" to "angry as I

have ever been." It has been used in previous reactivity studies (Blumenthal et al., 1995)

and has been found to accurately assess the psychological state of anger that is sensitive

to physiological reactivity. Test-retest reliability coefficients of .82 have been reported

(Wade, Price, Hamer, Schwartz, & Hart, 1990). Baseline anger was determined by

averaging two time-point ratings, before and after baseline periods, to produce a single

mean level of baseline anger. Experimental anger was assessed immediately following

the stressor.

Procedures

Screening

Before receiving an invitation to the laboratory session, participants were

questioned for cardiovascular insult, such as ischemic heart attack, myocardial infarction,

or cerebrovascular accident (stroke) within the past 5 years. Anyone reporting such

cardiovascular events was informed that they would not be able to participate in the study. Screening for cognitive impairment was done using the MMSE and scores of 24 or higher were required for participation. Participants were also screened for depression using the GDS; those scoring above 5 were excluded. Finally, screening involved religious orientation based on administration of the ROS. Only subjects who passed health screens and exhibited either I or E religious orientation type were included. Table 3 presents information on those who were excluded from the study at various stages for not meeting these criteria.

Table 3

Individuals Screened from Participation, Withdrawing, and Dropped from Study

Reason	Male	Female
Heart problems	24	8
Bypass surgery	10	1
Stroke	2	0
General/unspecified	10	6
High blood pressure	2	1
ROS	28	25
Nonreligious	11	12
Proreligious	17	13
Did not complete screening measures	2	3
Withdrew from study in screening	1	3
MMSE < 24	0	0
GDS > 5	1	2
Dropped due to equipment failure	1	4
Withdrew from study in lab session	0	2
Total	57	47

Consent and initial measures. Eligible subjects were invited to come for a laboratory session. They were asked to abstain from caffeine for 12 hours, and to refrain from cigarette smoking for one hour prior to their appointment. The session began with the presentation of an informed consent form that detailed all necessary information so participants could make an informed decision regarding their participation. Only subjects who provided written consent participated in the study. After consent was received, participants were screened for dementia and cognitive impairment using the MMSE. They were then asked to complete the HLC measure. Next they were asked to identify the most important person in their lives (e.g., spouse). Following this, a finger cuff for recording BP was attached to the middle finger of the participant's nondominant hand. Participants then entered a 10-minute baseline period in which they completed a minimally involving activity. In this case they reviewed National Geographic magazines and noted the article most preferred. At the conclusion of the baseline period, they completed the STAXI-2 and made a rating of their current anger level using the VAS.

Reactivity manipulations. Because this study is part of a larger project comparing reactivity to different types of stressors, following the 10 min baseline period, two standard reactivity manipulations were presented in counterbalanced order; one represented primarily a cognitive task (mental arithmetic) and the other represented an interpersonal challenge (public speaking). However, this study only considered reactivity responses to the interpersonal stressor, as the review of literature did not suggest a notable relationship between cognitive stressors and either religiosity or HLC.

In the reactivity manipulation utilizing an interpersonal stressor, participants were asked to role-play an interpersonal confrontation. In this hypothetical scenario, they were

denied payment for a medically necessary intervention (bone marrow transplantation) for the person earlier identified as being most important to them. They were told that the coverage was denied because of the expense and because no local providers were authorized by the insurance company to perform bone marrow transplantations even though competent and experienced physicians capable of performing the procedure practiced in the area. The interpersonal reactivity manipulation involved presenting a 3-minute speech to the insurance adjuster who had just denied their request for the bone marrow transplantation. Participants had 5 minutes to prepare, and then verbally delivered their response (for 180 s) in front of the research assistant and a small audience. Similar stressors have been previously found to elicit adequate reactivity in other samples (Carney et al., 1998). Following the speech, participants immediately completed the state items of the STAXI-2 and made a rating of their current anger level using the VAS.

Upon completion of the experiment, an inquiry was made regarding the possibility that any participant was experiencing adverse effects from the experiment. No serious physical complaints were received. Participants who were feeling emotionally distressed were comforted and encouraged to utilize relaxation strategies (provided as needed by the research assistant) prior to leaving. All participants were thanked for their cooperation and paid $30.

Data Analytic Strategy

A data analytic strategy was selected to directly address the specific aims and hypotheses of the current study. The goal of the analysis was to elucidate not only the main effect of religious orientation on change in CVR in response to an interpersonal

stressor in an older adult sample, but also to examine the interaction of religious orientation and HLC on CVR in an older adult sample. For example, it is possible that HLC may mitigate the effects of an I orientation in moderating reactivity to an interpersonal stressor.

The first research question of this study (Is there a differential effect of religious orientation on psychophysiological reactivity to an interpersonal stressor?) was addressed via a multivariate analysis of variance (MANOVA) along with exploratory analysis of descriptive data. The independent variable was religious orientation type, I or E, as determined by scores on the ROS. Because participants were selected on the basis of qualification as I or E, the ROS variable was considered dichotomous. The dependent variables were change scores on measures of HR, SBP, DBP, and self-reported state anger. Change scores were calculated by subtracting baseline (pretest) ratings from experimental stressor (posttest) ratings for each of the previously mentioned dependent measures, as done in similar studies (Rutledge, Linden, & Paul, 2000). These measures were considered continuous variables. Alpha was set at .05, reflecting the exploratory nature of this research. Effect sizes were also calculated, using the standardized mean difference statistic. The purpose of the effect size calculation was to provide a measurement of the magnitude of the effect of the independent variable, religious orientation as I or E, upon the dependent measures.

Similar analytic procedures were used to address whether an internal HLC is correlated with reduced psychophysiological reactivity in an older adult sample, the second research question of this study. The three scales of the MHLC were combined into one unidimensional scale in order to facilitate this differentiation of participants.

The two external scales, powerful others and chance, were true scored, while the internal scale was reversed scored. In a reverse scoring system, the highest score becomes the lowest, the second highest becomes second lowest, and so forth. In this manner, the individual who scores high on the internal scale may be perceived as having scored low on the external scale. This process produced a scale with possible scores ranging from 12 to 102, with higher scores for individuals endorsing external attributions for health loci of control, and lower scores for individuals endorsing internal attributions. Obtained scores ranged from 34 to 73, reflecting a slight internal tendency for the entire sample, with no extreme internal or external scores. Because the resulting distribution of scores did not separate into two groups as was anticipated, it was decided not to categorize this variable but to leave it continuous.

Correlations and descriptive analyses (e.g., means, standard deviations) were used to investigate the magnitude of the relationship of HLC with the dependent measures. Change scores were calculated by subtracting baseline (pretest) ratings from experimental stressor (posttest) ratings for each of the previously mentioned dependent measures. Alpha was set at .05. Effect sizes were also calculated, again using the standardized mean difference statistic.

Two additional analyses addressed the third research question (do intrinsically and extrinsically religious older adults differ on internal and external HLC scores?). The effect of religious orientation on HLC was evaluated by calculating the standardized mean difference effect size. Next, an ANOVA was conducted to determine if there was a significant difference between I and E orientations on the measure of HLC.

To address the final research question of this study and evaluate the combined

effect of religious orientation and HLC on psychophysiological reactivity in older adults, multiple regression analyses were calculated. The analytic model included three independent variables, ROS, MHLC unidimensional scale (MHLC UNI), and an interaction term, ROS*MHLC. Separate regression analyses were conducted for each of the previously mentioned dependent measures.

CHAPTER IV

RESULTS

Religious Orientation and Reactivity

Descriptive data for reactivity measures were calculated separately for I and E samples as well as for the entire sample combined (see Table 4). Reactivity data were obtained by calculating change scores (poststressor minus prestressor) for each participant on each dependent variable. The dependent variables were the three primary measures of physiological reactivity (HR, SBP, and DBP) and the two psychological

Table 4

Differences Between Intrinsic and Extrinsic Groups in Reactivity Change Scores

Dependent variables	ROS	Mean	Standard deviation	n	Effect size	F	P
State anger	Intrinsic	3.19	5.21	37			
	Extrinsic	8.16	12.30	38	.51[a]	5.14	.03
	Total	5.71	9.75	75			
Current anger	Intrinsic	10.73	16.24	37			
	Extrinsic	19.05	27.05	38	.37	2.60	.11
	Total	14.95	22.63	75			
HR	Intrinsic	11.19	17.64	37			
	Extrinsic	7.72	8.30	38	-.25	1.20	.28
	Total	9.43	13.75	75			
SBP	Intrinsic	21.84	30.15	37			
	Extrinsic	39.54	25.37	38	.61	7.58	.01
	Total	30.81	29.04	75			
DBP	Intrinsic	14.67	14.83	37			
	Extrinsic	21.20	15.08	38	.43	3.58	.06
	Total	17.98	15.22	75			

[a] Alpha level for significance testing was .05.

measures of state changes in anger (state anger on the STAXI-2, and current anger on the Visual Analogue Scale (VAS).

Because the dependent measures were likely interrelated, a MANOVA was employed to assess whether the differences in mean change scores between these groups were large enough to be considered statistically significant. The results of these analyses conducted on religious orientation and reactivity are presented in Table 4. Analyses comparing I and E samples were used to address the first research question, whether the intrinsically religious older adult sample would show lower levels of reactivity than the extrinsically religious older adult sample. Effect sizes were also calculated in order to assess the magnitude of the effect of religious orientation on physiological reactivity and self-reported anger.

The MANOVA was statistically significant at the .05 level, $F(1,73) = 2.345, p = .05$. Univariate analyses revealed statistical significance for two dependent variables, SBP and state anger. For SBP, E individuals showed higher levels of reactivity ($M = 39.54, SD = 25.38$) than did I individuals ($M = 21.84, SD = 30.15$), $F(1,73) = 7.58, p = .01$. The standardized mean difference effect size was .61. On the self-report measure of state anger, E individuals ($M = 8.16, SD = 12.30$) demonstrated greater anger than did I individuals ($M = 3.19, SD = 5.21$), $F(1,73) = 5.14, p = .03$. The standardized mean difference effect size was .51. On the physiological measure of DBP, E individuals showed higher levels of reactivity ($M = 21.20, SD = 15.08$) than did I individuals ($M = 14.67, SD = 14.83$). However, these differences were not statistically significant, $F(1,73) = 3.58, p = .06$. The standardized mean difference effect size was .43.

Health Locus of Control and Reactivity

Health locus of control was assessed through scores on the MHLC. This measure
includes three scales, one measuring internal HLC, and two measuring external HLC:
powerful others and chance. These three scales were combined into one unidimensional
scale (MHLC UNI) in order to facilitate differentiation of participants as predominantly
internal or external.

Descriptive analyses of demographic data were performed for this combined
scale, MHLC UNI. The mean score for the entire sample ($n = 75$) was 56.80 ($SD = 7.92$).
The scale has a possible range of scores from 12.00 to 102.00, with those endorsing
mainly internal attributions scoring at the lower end of the scale. Additional summary
statistics are presented in Table 5.

Descriptive analyses (e.g., means and standard deviations) and correlations of
reactivity data were performed for the MHLC UNI. As before, reactivity data were

Table 5

Descriptive Statistics for Group Differences on Multidimensional Health Locus of
Control Unidimensional Scale, and Religious Orientation Scale x Multidimensional
Health Locus of Control Unidimensional Scale

Variable Mean (*SD*) Range	Group		
	Intrinsic (*n* = 37)	Extrinsic (*n* = 38)	Total Sample (*n* = 75)
MHLC UNI	53.46 (9.17) 34.00 – 70.00	60.05 (4.66) 49.00 - 73.00	56.80 (7.92) 34.00 - 73.00
ROS x MHLC UNI	53.46 (9.17) 34.00 – 70.00	120.11 (9.31) 98.00 - 146.00	87.23 (34.78) 34.00 – 146.00

obtained by calculating change scores (e.g., poststressor minus prestressor) for each

participant on each dependent variable. The dependent variables again were the three

primary measures of physiological reactivity (HR, SBP, and DBP) and the two

psychological measures of state anger (state anger on the STAXI-2, and current anger on

the VAS). Two-tailed tests of statistical significance were utilized. Analyses were used

to address the second research question, whether an internal HLC would be correlated

with reduced psychophysiological reactivity in an older adult sample.

Results of these analyses are presented in Table 6. Statistical significance was

achieved for two physiological dependent variables, SBP and HR. The correlation

between MHLC UNI score and SBP change score reached statistical significance at the

.01 level, $r = .33$, $p = .00$, and accounted for approximately 11% of the variance in this

measure. The correlation between MHLC UNI score and HR change score reached

statistical significance at the .05 level, $r = -.27$, $p = .02$, and accounted for approximately

7% of the variance in this measure. Because this correlation was negative, the

relationship between scores on the MHLC UNI and traditional measures of reactivity

appears complex. Notably, HR did not conform to the pattern of SBP; instead, higher

scores on the MHLC UNI, indicating greater externality, appear somewhat related to

lower HR. This relationship may reflect the tendency of HR reactivity to decrease with

age (Jennings et al., 1997; see discussion of religious orientation, HLC and reactivity).

Religious Orientation and Health Locus of Control

Differences on the MHLC UNI were evaluated to test the hypotheses that

intrinsically and extrinsically religious older adults would differ on internal and external

Table 6

Bivariate Correlations among Religious Orientation Scale, Multidimensional Health Locus of Control Unidimensional Scale, Religious Orientation Scale x Multidimensional Health Locus of Control Unidimensional Scale, and Dependent Reactivity Measures [a]

Variable	ROS	State anger	Current anger	HR	SBP	DBP	MHLC UNI	ROS x MHLC UNI
ROS	1.00	.26 [b]	.19	-.13	.31 [c]	.22	.42 [c]	.97 [c]
State anger	.26 [b]	1.00	.825 [c]	-.01	.22	.35 [c]	.13	.27 [b]
Current anger	.195	.82 [c]	1.00	-.02	.25 [b]	.38 [c]	.02	.16
HR	-.137	-.01	-.02	1.00	-.14	.29 [b]	-.27 [b]	-.18
SBP	.31 [c]	.22	.25 [b]	-.14	1.00	.65 [c]	.33 [c]	.34 [c]
DBP	.22	.35 [c]	.38 [c]	.29 [b]	.65 [c]	1.00	.09	.20
MHLC UNI	.42 [c]	.13	.02	-.27 [b]	.33 [c]	.09	1.00	.63 [c]
ROS x MHLC UNI	.97 [c]	.25 [b]	.16	-.18	.34 [c]	.20	.63 [c]	1.00

Note: Reported scores for State anger, Current anger, HR, SBP, and DBP are change scores calculated as the difference between pre- and posttest scores on these dependent measures.
[a] ROS x MHLC UNI is the interaction term, calculated as ROS score multiplied by MHLC UNI score.
[b] Correlation is significant at the .05 level (2-tailed).
[c] Correlation is significant at the .01 level (2-tailed).

locus of control scores, and answer the third research question of this study. The I adults did receive lower scores (*M* = 53.46, *SD* = 9.17), indicating that they endorsed fewer items of externality and more items of internality. E adults (*M* = 60.05, *SD* = 4.66) received higher scores indicating they endorsed more items of externality and fewer items of internality. A *t* test for independent means showed that mean differences were statistically significant, *t* (73) = -3.94, *p* = .00, alpha = .05. The standardized mean difference effect size was .95, indicating the magnitude of this difference is quite large.

Religious Orientation, Health Locus

of Control, and Reactivity

To address the combined effect of HLC and religious orientation on

psychophysiological reactivity among older adults, the fourth research question of this

study, an interaction term, ROS x MHLC UNI was created. This term was calculated by

multiplying each individual's score on the ROS by his/her score on the MHLC UNI.

Summary descriptive statistics are presented in Table 4 for this term and the MHLC UNI.

Using the interaction term, ROS x MHLC UNI, in addition to the two original

independent variables, ROS and MHLC UNI, effects on reactivity were investigated.

Regression analyses were conducted separately for each dependent measure. The results

of these analyses are discussed below. Bivariate correlations were also calculated and are

presented in Table 6.

Systolic Blood Pressure

SBP was selected first because it showed a strong relationship with both the ROS

and the MHLC UNI in the separate analyses of these predictor variables. The regression

model included the interaction term ROS*MHLC UNI, as well as the MHLC UNI and

the ROS. This model was statistically significant, $F(3,71) = 5.03, p = .00$. When each

independent variable is considered individually in the prediction model, however, none

reach statistical significance. Results of these analyses are presented in Appendix H.

State Anger

State anger was selected next because it showed a strong relationship with the

ROS in the separate analysis of this predictor variable. The regression model included the interaction term ROS*MHLC UNI, as well as the MHLC UNI and the ROS. This model failed to reach statistical significance, $F(3,71) = 1.93, p = .13$. The results of these analyses are presented in Appendix H.

Heart Rate

HR was selected next because it showed a strong relationship with the MHLC UNI in the separate analysis of this predictor variable. However, the regression model, same as earlier described, failed to reach statistical significance. The results of these analyses are presented in Appendix H.

Current Anger

The regression model did not reach statistical significance. The results of these analyses are presented in Appendix H.

Diastolic Blood Pressure

The regression model did not reach statistical significance. The results of these analyses are presented in Appendix H.

CHAPTER V

DISCUSSION

Overview

The purpose of the present research was to better understand how religious orientation might interact with HLC to affect psychophysiological reactivity to stress in an older population. The specific research aims of this study were: (a) to explore differences in psychophysiological reactivity and hostility for two types of religious orientation (e.g., extrinsic and intrinsic) in an older adult sample; (b) to explore differences in psychophysiological reactivity and hostility for different health loci of control (e.g., internal vs. external HLC) in an older adult sample; (c) to explore relationships between HLC and religious orientation in a sample of intrinsically and extrinsically religious older adults. These aims were conceptualized and organized into the following questions addressed in this study:

1.   Does religious orientation have a differential effect on reactivity to an interpersonal stressor in an older adult sample?

2.   Does an internal HLC correlate with reduced psychophysiological reactivity in an older adult sample?

3.   Do intrinsically and extrinsically religious older adults differ on internal and external HLC scores?

4.   What is the combined effect of HLC and religious orientation on psychophysiological reactivity among older adults?

The discussion that follows will include a review and interpretation of the findings related to each of the above research questions and aims. The discussion will include a review of the limitations of this study and suggestions for future research projects in this area. Finally, conclusions that may be drawn from this study will be summarized.

Review of Major Findings

In general, the results of this study were supportive of the original hypotheses, and suggest the existence of important relationships among religious orientation, psychophysiological reactivity, and HLC in an older adult sample. In this sample of intrinsically and extrinsically religious older adults, there emerged strong indications that religious orientation, HLC, and the interaction between them should be considered in future research concerning the moderation of psychophysiological reactivity. As discussed in previous research on psychophysiological reactivity, hyperreactivity to stressors is a plausible mechanism by which hostility may influence the development of CVD, and there is evidence of reactivity responses resulting in increased cardiovascular changes that could lead to CVD (Krantz & Manuck, 1984; Pfiffner & Battig, 1989). Additionally, these hyperreactive responses are more likely in those individuals who are hostile than in individuals who are not (Booth-Kewley & Friedman, 1987; Harbin & Blumenthal, 1985), and anger/hostility have been found to be predictive of CVD (Matthews, 1988; Miller et al., 1994). Thus, the stress-moderating roles played by an intrinsic religious orientation and an internal HLC as illuminated in this study impact

the experience of interpersonal stressors, psychophysiological reactivity, and potentially, the prevention of CVD.

Religious Orientation and Reactivity

Based on previous research in the religious orientation and psychophysiological reactivity literature, it was hypothesized that intrinsically religious older adults would show lower levels of psychophysiological reactivity, as indicated by BP and HR measures, than would extrinsically religious older adults.

The results obtained in this study lend support to previous observations suggestive of a link between intrinsic religious orientation and reduced psychophysiological reactivity (Ellison, Boardman, Williams, & Jackson, 2001; Ferraro & Albrecht-Jensen, 1991; Masters et al., 1997). Differences in mean reactivity change scores between intrinsically and extrinsically religious older adults were statistically significant for two dependent variables: SBP and self-reported state anger (see Figure 1). Although, DBP changes failed to reach statistical significance, they were in the anticipated direction and support the hypothesis. Additionally, standardized mean difference effect sizes for these variables (SBP, state anger, and DBP) were in the moderate range, indicating the relative magnitude of these differences was notable. Specifically, the intrinsically religious older adults showed, on average, less change between baseline and subsequent measures of SBP and state anger. These findings are consistent with the expectation that intrinsically religious individuals would be able to employ their beliefs or faith in a manner to reduce the impact of a stressful interpersonal situation.
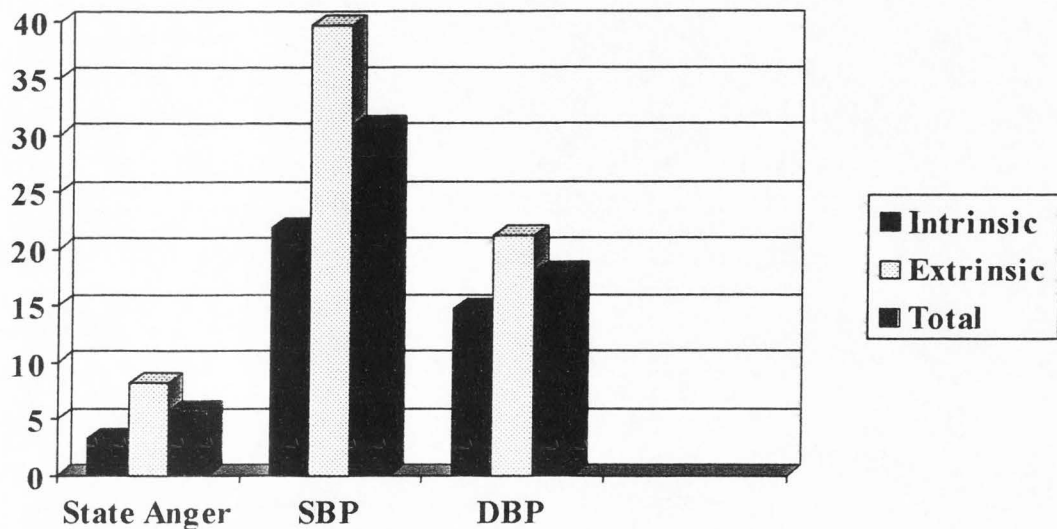
Figure 1. Religious orientation and reactivity: Differences between intrinsic and extrinsic groups in reactivity change scores.

Furthermore, observed differences in changes in levels of SBP are consistent with studies

that have shown BP reactions are tied to sympathetic nervous system activation

(adrenergic responses), while HR responses are primarily related to the parasympathetic

nervous system (cholinergic responses; Jennings et al., 1997). Similar studies

incorporating SBP, DBP, and HR have also found only statistically significant SBP

changes in reaction to stressful stimuli (Kohler et al., 1997). Some consider this greater

response of SBP to confirm "an adrenergically-mediated mechanism" for reactivity

(Pfiffner & Battig, 1989, p. 184). As explained by Swain and Suls (1996), the failure of

DBP measurements to reach statistical significance may reflect several challenges: first,

DBP is subject to a complex interaction of vascular and myocardial factors; second, it is

difficult to measure; and, third, the magnitude of DBP changes is generally small.

Despite their concerns regarding the use of reactivity scores to reliably indicate CHD

risk, these authors conclude that short-term stability of these reactivity measures has been

shown, and even acute or transitory periods of hyperreactivity could produce risk for

acute events (Swain & Suls; see also Steptoe et al., 2000).

Age may provide additional explanation of the physiological observations of this

study. As described by Jennings et al. (1997), "aging seems to decrease cardiac-pump

function (e.g., heart rate and cardiac output) but to enhance vascular responses" (p. 235).

In a very thorough review of the physiology of cardiovascular aging, Folkow and

Svanborg (1993) noted the age-related reduction of HR and increases in SBP and DBP in

"westernized" populations (emphasis in original). These authors suggested that such

increases may be largely influenced by environment. They cited research on subtropical

groups living a tribal lifestyle in which these increases did not occur; and they noted that

for Japanese men living in Japan, Hawaii, and California, those in California had the

highest BP. Thus, they suggested that behaviors, such as salt intake, and exposure to

psychosocial stimulation may both be factors in the increased BP (Folkow & Svanborg).

In sum, this underscores the importance of investigations into complex environmental

factors related to healthy aging.

It is important to note that observed changes in state anger were consistent with

physiological changes observed. Specifically, differences in self-reported levels of state

anger given by I and E individuals matched SBP data obtained from them. I individuals

reported less state anger, suggesting they did not react to the interpersonal stressor with

feelings of anger or hostility; they also showed low levels of SBP reactivity. In contrast,

E individuals reported higher levels of state anger, suggesting they reacted to the stressor

with more anger and hostility; accordingly, they showed high levels of SBP reactivity.

The similarity between observed changes in state anger and in SBP is consistent with the literature. As reported by Suarez and Williams (1989), hostile subjects who reported increased anger showed greater cardiovascular changes. These authors concluded that emotional arousal was "directly responsible for the differential cardiovascular responses" they observed (Suarez & Williams, p. 413). In a major meta-analysis, Booth-Kewley and Friedman concluded that the anger/hostility/aggression category of personality variables relates reliably to CHD and atherosclerosis (1987). And although Matthews (1988) challenged aspects of Booth-Kewley and Friedman's methodological approach, she concurred that hostility is a major influence in the precipitation of initial CHD events. Thus, the high reactivity seen in both state anger and SBP reflects the expected relationship between these variables, and illuminates the potential importance of anger-moderating factors.

The differences in self-reports of experienced levels of anger again suggest that I individuals are able to use their belief system to help them re-interpret the situation. This re-interpretation may be enabled by increased feelings of control (Dull & Skokan, 1995), deep belief in a higher power (McIntosh & Spilka, 1990), or other positive psychological traits such as forgiveness and active coping skills (Ellison et al., 2001). Interestingly, the greater sense of personal control and active coping skills may both insulate I individuals from the effects of stressors (Ellison et al.; McIntosh & Spilka) by strengthening belief in the self. By contrast, belief in a higher power, seems to work in the opposite fashion, and may thus insulate I individuals from the effects of stressors by reducing the role of the self. Forgiveness offers another possible explanation for the differences in experienced levels of anger. Forgiveness is posited to work by enhancing the ability of I individulas

to forgive others for wrongdoing; E individuals would be more likely to react with anger

or hostility (e.g., holding a grudge; Koenig, Moberg, & Kvale, 1998). Another possible

explanation is that I individuals are generally more peaceful than E individuals.

Investigators have identified that a feeling of peace derived from having a sense of

meaning and connecting to something larger than the self is a key factor in the spirituality

construct (Ironson et al., 2002; Peterman, Fitchett, Brady, Hernandez, & Cella, 2002;

Underwood & Teresi, 2002). These descriptions seem to closely resemble early

descriptions of *intrinsic* (Donahue, 1985), and it is conceivable that a sense of inner peace

may buffer intrinsics from the effects of daily stressors. Regardless of the mechanism

employed, in the present study, I individuals moderated their responses to the stressor to a

degree that E individuals did not.

Health Locus of Control and Reactivity

Based on previous research in the HLC literature and psychophysiological

reactivity literature, it was hypothesized that individuals with internal health loci of

control would exhibit lower levels of psychophysiological reactivity (as indicated by BP

and HR measures) than individuals with external health loci of control. Because they

consider themselves responsible for their health, individuals endorsing internal

attributions for health loci of control are more likely to engage in active coping measures

in response to stressors (Jackson & Coursey, 1988; Wallston et al., 1999). Therefore,

they would be expected to show lower levels of psychophysiological reactivity.
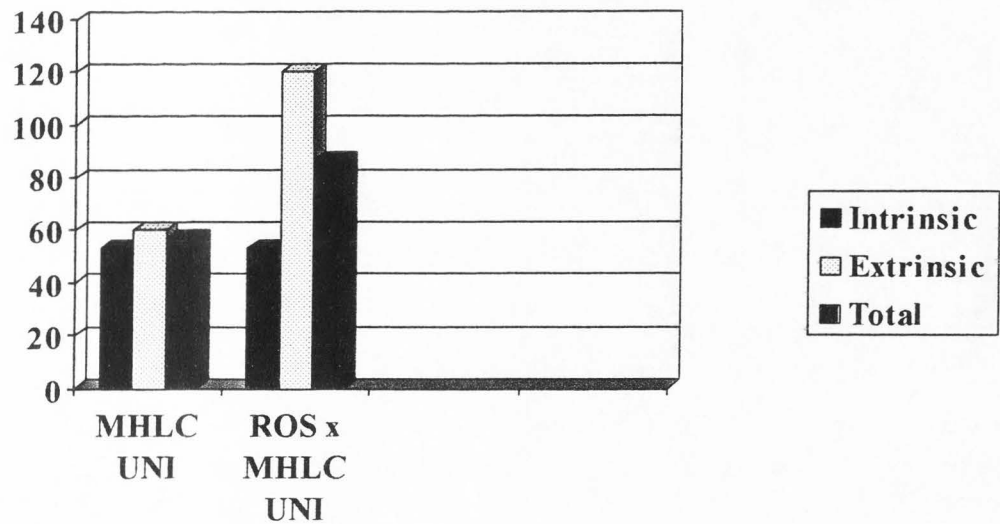
Figure 2. Health locus of control and reactivity: Descriptive statistics for group differences.

The results of this study suggest that an internal HLC is strongly correlated with reduced levels of psychophysiological reactivity in an older adult sample (Figure 2). Statistically significant correlations were obtained between HLC scores on the MHLC UNI and levels of psychophysiological reactivity to an interpersonal stressor, as indicated by SBP and HR. Additionally, these correlations were of sufficient magnitude ($r = .33$ and $r = -.27$, respectively) to suggest that the relationships were of practical importance. The negative correlation for HR was somewhat unexpected. In an attempt to clarify the reason for this negative correlation, a median split was conducted on the MHLC UNI, and the resulting groups were compared on mean age. The median on the MHLC UNI was 59.00. The mean age of those below and including the median was 71.12, while the mean age of those above was 64.51. This difference in age, and the resulting negative correlation between HR and MHLC UNI score, may reflect the effect of aging to

decrease levels of cardiac output (Harbin & Blumenthal, 1985; Jennings et al., 1997). Nevertheless, given the strong relationship between SBP and HLC, the results of this study suggest that for older adults, health attitude (i.e., attribution of control for personal health) may be an important determinant in the experience of and reaction to stress.

Correlation of Religious Orientation, Health

Locus of Control, and Reactivity

In the third and fourth questions of this study, the relationship between religious orientation and HLC was investigated. Although an I religious orientation seems intuitively to correspond to an internal HLC, some data challenged this assumption. In Masters and DeBerard's (2001) investigation with college students, I religious orientation was correlated with increased belief that powerful others, chance, and/or God are responsible for one's health, resulting in a more external, or passive, HLC. Also, in McIntosh and Spilka's (1990) study of self-identified Christians moderately interested in religion, their "hoped for positive correlation between I faith and internal control is directly contradicted for both general and health internal control" (p. 177). However, earlier findings linked an internal locus of control to an I orientation (Donahue, 1985). Based on the previous work of Masters and DeBerard, and recent HLC literature (Wallston, 1997), it was hypothesized that an external HLC might mitigate the positive health effects of an I religious orientation. The present study aimed to investigate this relationship between religious orientation and HLC in another population, older adults, and add to the research literature in this area.

The results of this study suggest that the relationship between religious orientation and HLC is both complex and important to understanding moderation of psychophysiological reactivity. First, in this population of older adults, intrinsically religious individuals endorsed more items of internality than of externality on the HLC measure, and these scores significantly differed from those for the E individuals. The effect size was in the large range, indicating the relative magnitude of these differences was practically relevant. These findings are similar to those observed for an internal locus of control in a black sample (Jackson & Coursey, 1988). When reviewed in light of existing literature, these results suggest an intrinsic orientation and an internal HLC are closely related, although findings have been inconsistent.

Given the previously discussed observations that both an *intrinsic* religious orientation and an *internal* HLC were strongly correlated with reduced SBP levels, the interaction of HLC and religious orientation is particularly interesting. The results of this study suggest that the interaction of HLC and religious orientation is an important predictor of physiological reactivity as measured by SPB. ROS*MHLC UNI accounted for approximately 12% of the variance in SBP ($r = .34$), and achieved statistical significance at the .01 level. However, the interaction provided only slightly more predictive power than either religious orientation or HLC individually. As previously discussed, statistically significant bivariate correlations at the .01 level were achieved for both an I religious orientation and an internal HLC with lower levels of SBP ($r = .31$ and $r = .33$, respectively).

Despite strong correlations for each of the independent variables, ROS, MHLC UNI, and ROS*MHLC UNI, none was an individually significant predictor in the

regression models. This suggests the variables are multicolinear, meaning there is considerable relationship among the constructs they represent. In fact, correlations among these variables were substantive and statistically significant at the .01 level: for ROS to MHLC UNI, $r = .42$; for ROS to the interaction term, ROS*MHLC UNI, $r = .97$. Thus, I religious orientation, internal HLC, and the interaction between them may to large extent measure similar aspects of psychosocial functioning.

The multicolinearity of these variables may also indicate the presence of an underlying common construct, such as active coping. Active coping may operate on a number of different pathways, as it may alter cognitive processes and may lead one to adopt more healthful behaviors. Active coping may be a key component differentiating an internal HLC from an external one (Furnham & Steele, 1993; Wallston & Wallston, 1981). Also, active coping has been related to an I religious orientation (Jackson & Coursey, 1988; McIntosh & Spilka, 1990). Several researchers have recently raised the possibility that underlying common constructs may better explain observations of a positive relationship between religion/spirituality and health (McCullough et al., 2000; Shahabi et al., 2002; Thoresen & Harris, 2002). Active coping is just one such construct.

The protective factors associated with these psychosocial variables in this study largely support the findings of previous studies that have tied certain aspects of spirituality/religion to positive health status. Additionally, these findings support existing literature on the connections between mind and body, and should encourage researchers in this domain. But as the results of this study demonstrate, there is still much fine-tuning to be done. The constructs that represent psychosocial factors used to moderate interpersonal stress need to be clarified and delineated. Also, the means or mechanisms

by which the moderation occurs need to be identified. This study contributes to the literature evidencing a relationship between psychosocial factors and cardiovascular functioning (Steptoe et al., 2000), but the mechanisms remain unclear.

Limitations of the Study and Directions for Future Research

There are important limitations to keep in mind when evaluating the implications of the findings of this study. First and most importantly, there are additional variables that were not controlled or co-varied, such as accuracy of self-report, or length of time in current religious affiliation or religious orientation. However, this is the case whenever psychological constructs are investigated. Additionally, because the individuals in this study were screened and selected based on their I and E religious orientations, the results should only be generalized to individuals of these religious orientations. Thus, the study does not provide a complete picture of the interaction between religious orientation and HLC throughout the older adult population. Future studies could incorporate the indiscriminately proreligious and nonreligious participants to facilitate generalization to a broader spectrum of individuals.

Generalization of the results of this study is also limited by the predominance of one religious affiliation in the sample. Given the predominance of LDS affiliation in Cache Valley, the percentage of LDS participants in the total sample (42.7%) is not surprising. In a recent Cache County newspaper poll, 78% of participants identified themselves as LDS, and 13% claimed nonactive LDS status (Brunson, 2002). The Wasatch front, which encompasses Cache Valley, is recognized as the core region of the LDS faith. Within this study, 73% of the intrinsically religious sample defined

themselves as LDS members; the extrinsically religious sample was more diverse, with 13.2% claiming LDS affiliation. Unfortunately, the limited cultural representation confounds religious affiliation (membership) and religious orientation (manner of being religious).

Although the *religious affiliation by religious orientation group* percentages discussed seem to suggest that LDS individuals are more apt to be intrinsically oriented than people of other faiths, that conclusion could be misleading. First, people of other faiths were not equally sampled in this study. Second, it may be that being a member of a minority faith promotes a greater awareness of the extrinsic benefits of religion/spirituality. Third, as noted by McIntosh and Spilka (1990), the LDS theology may promote certain healthful behaviors, leading to a response set that seems intrinsic. Creed, orthodoxy, and actual intrinsic religious orientation need to be disentangled, particularly in samples where one faith predominates. Although religious affiliation may remain stable, specific factors associated with one's manner of being religious/spiritual may vary greatly (Thoresen & Harris, 2002).

Knowledge of the operation of the religious orientation could be much richer if a wide variety of faiths were investigated in future studies. The specific findings of this study would benefit from future investigation with more diverse and potentially "pure" intrinsic/extrinsic samples. Differences in reactivity might be amplified if these groups were more distinct. Similarly, the relationship between intrinsic religious orientation and internal HLC might be clearer in more differentiated samples.

Particularly challenging to the interpretation and practical application of the results of this study is the difficulty of pinpointing precisely the boundaries of the

constructs investigated here. Religious orientation and HLC both represent aspects of larger, even more vague and cumbersome constructs; and both terms overlap with a number of other related terms (e.g., HLC and active coping). Nonetheless, the findings of this study are strong enough to suggest that each of these terms represent a construct that is of practical clinical relevance that warrants further investigation. Future studies that incorporated some of these overlapping terms could delineate among them and further elucidate specific details of their interaction on psychophysiological reactivity.

Additionally, because factors beyond the psychological constructs of interest affect psychophysiological measures, the reliability and ecological validity of the findings would be strengthened through the use of repeated measures and assessment of physiological measures in natural settings. Some of the concerns raised about the reliability of using reactivity measures as predictors of CHD could be addressed through longitudinal studies. In fact, longitudinal studies would also allow investigation of the variation in specific aspects of religiousness/spirituality over the life span, and are highly recommended (Mills, 2002; Thoresen & Harris, 2002). Certainly similar future studies could also incorporate measures more specific to anxiety reactions, such as galvanic skin response, to explore the calming effect an intrinsic religious orientation may provide (Koenig, 1991).

Finally, consistent conceptual distinctions between religiousness and spirituality are needed (Mills, 2002; Shahabi et al., 2002). As noted by Thoresen and Harris (2002), there is currently no well-controlled data on spirituality and health as separate from religion or religiousness. Measures like the ROS might not provide a complete assessment of an unaffiliated individual's spiritual commitment or manner of being

spiritual. Even for strongly affiliated persons, separate assessment of religiousness and spirituality might facilitate more precise understanding of the function of these important aspects on daily life and health.

Conclusions

Based on the findings of the current study, religious orientation, HLC, and their interaction, can moderate levels of psychophysiological reactivity to an interpersonal stressor. As suggested by the literature, intrinsically religious older adults were found to show lower levels of SBP reactivity than were extrinsically religious older adults when exposed to an interpersonal stressor. It is supposed that some component of their internalized belief system enables them to reinterpret this stressful situation in a less stressful manner. These individuals also reported experiencing lower levels of anger poststressor than did extrinsically religious individuals, again suggesting their interpretation of the stressor was somehow beneficially altered by their beliefs. Changes in DBP were in the same direction, and supportive of the conclusion stated, but were not statistically significant. Changes in HR did not show the same pattern, but this may be due to effects of aging.

Next, an internal HLC was highly correlated with an I religious orientation. Individuals with an internal HLC endorse items indicating they take personal responsibility for their health status, rather than attributing that responsibility to an external source (e.g., powerful others, or chance). This similarity between an internal HLC and an I religious orientation suggests an underlying common aspect, such as more active coping styles.

Finally, the interaction between religious orientation and HLC was found to be a strong predictor of psychophysiological reactivity, as measured by SBP, but only slightly better than either religious orientation or HLC alone. This suggests that those individuals with the lowest levels of psychophysiological reactivity may have been using the combination of an I religious orientation and an internal HLC to affect their interpretations of presented stressors and moderate their physiological responses. But these results also suggest that these constructs are closely related, and further delineation is needed.

The implications of these findings are pertinent and provocative in both clinical and research domains. Clinically, the findings suggest that inculcating an internal HLC could be an extremely beneficial goal of epidemiological projects and rehabilitation programs, encouraging both better health behaviors and the use of more active coping skills. More controversially, the positive role of an I religious orientation is supported, leading one to wonder whether and how promoting any religious stance could be part of health improvement campaigns. However, as was hopefully made clear in the discussion of religious orientation, an I religious orientation exists for its own sake; it is an end itself. Therefore, trying to develop an intrinsic religious orientation for the sake of health benefits is inherently contradictory and represents an extrinsic behavior.

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APPENDICES

Appendix A:

Consent Form

UtahState
UNIVERSITY

DEPARTMENT OF PSYCHOLOGY
Logan, Utah 84322-2810
Telephone: (801) 797-1460
FAX: (801) 797-1448

Page 1 of 2
Date created July 21, 2000
Date: _____

Informed Consent Form
Aging, Religiosity, and Reactivity in Adults

Introduction/Purpose. Professor Masters in the Psychology Department at Utah State University is conducting a research study to find out more about the role of religiosity in mental and physical health. You have been asked to take part because of your response to our advertisement. There will be approximately 160 participants in this study which involves research.

Procedures. If you agree to be in this study, the following will happen to you. First you will complete a brief paper-pencil survey and participate in a brief interview. Then your blood pressure and heart rate will be continuously measured while you look at pictures, perform an arithmetic task, and make a brief impromptu speech. You will also complete another brief questionnaire three times. The entire study will require about one hour on one occasion.

Risks. You may experience arousal and increases in blood pressure and heart rate that will not exceed that encountered in your daily life. You may also experience uncomfortable emotions.

Unforeseeable Risks. Since this is an experiment, there may be some unknown risks that are currently unforeseeable.

Benefits. There may or may not be any direct benefit to you from these procedures. Some benefits that you may experience include gaining information on your blood pressure and heart rate as well as knowledge of how you scored on the questionnaires. The investigator, however, may learn more about how religiosity affects health. Information gained from this study may benefit psychological and medical knowledge and others in the future.

Explanation & offer to answer questions. A research assistant has explained this study to you and answered your questions. If you have other questions or research-related problems, you may reach Professor Masters at 435-797-1463.

Payment. You will be paid $30 at the end of this study for your participation. There are no costs to you. If you should choose to withdraw from the study at any time you will still be paid $30.

UtahState
UNIVERSITY

DEPARTMENT OF PSYCHOLOGY
Logan, Utah 84322-2810
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Page 2 of 2

Date: _____

Informed Consent Form
Aging, Religiosity, and Reactivity in Adults

Voluntary nature of participation and right to withdraw without consequence. Participation in research is entirely voluntary. You may refuse to participate or withdraw at any time without consequence or loss of benefits. You may be withdrawn from this study without your consent by the investigator if at any time you indicate having had previous heart disease or stroke.
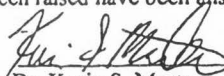
Confidentiality. Research records will be kept confidential consistent with federal and state regulations. Only the investigator will have access to the data, and it will be kept in a locked file cabinet in a locked room. The data will be kept indefinitely but since your name will not appear on any forms and since data will be stored in numerical form, your confidentiality will be protected.

IRB Approval Statement. The Institutional Review Board (IRB) for the protection of human subjects at Utah State University has reviewed and approved this research project.

Copy of consent. You have been given two copies of this Informed Consent. Please sign both copies and retain one copy for your files.

Investigator Statement. "I certify that the research study has been explained to the individual named below, by me or my research staff, and that the individual understands the nature and purpose, the possible risks and benefits associated with taking part in this research study. Any questions that have been raised have been answered."

Signature of PI. _____
Dr. Kevin S. Masters
Principal Investigator
435-797-1463

You agree to participate.

Signature of Subject. _____   _____

Subject's signature   Date

Appendix B:

Religious Orientation Scale

INQUIRY CONCERNING SOCIAL AND RELIGIOUS VIEWS

The following items deal with various types of religious ideas and social opinions. We should like to find out how common they are.

Please indicate the response you prefer, or most closely agree with, by writing the letter corresponding to your choice in the right margin.

If none of the choices express exactly how you feel, then indicate the one which is closest to your own views. If no choice is possible, you may omit the item.

There are no "right" or "wrong" choices. There will be many religious people who will agree with all the possible alternative answers. Please pick only one answer for each item.

1. What religion offers me most is comfort when sorrows and misfortune strike.

   a. I definitely disagree   _____
   b. I tend to disagree
   c. I tend to agree
   d. I definitely agree

2. One reason for my being a church member is that such membership helps to establish a person in the community.

   a. Definitely not true   _____
   b. Tends not to be true
   c. I tend to agree
   d. I definitely agree

3. The purpose of prayer is to secure a happy and peaceful life.

   a. I definitely disagree   _____
   b. I tend to disagree
   c. I tend to agree
   d. I definitely agree

4. It doesn't matter so much what I believe so long as I lead a moral life.

   a. I definitely disagree   _____
   b. I tend to disagree
   c. I tend to agree
   d. I definitely agree

5. Although I am a religious person I refuse to let religious considerations influence my everyday affairs.

   a. Definitely not true of me   _____
   b. Tends not to be true
   c. Tends to be true
   d. Clearly true in my case

6. The church is most important as a place to formulate good social relationships.

   a. I definitely disagree   _____
   b. I tend to disagree
   c. I tend to agree
   d. I definitely agree

7. Although I believe in my religion, I feel there are many more important things in life.

   a. I definitely disagree   _____
   b. I tend to disagree
   c. I tend to agree
   d. I definitely agree

8. I pray chiefly because I have been taught to pray.

   a. Definitely true of me   _____
   b. Tends to be true
   c. Tends not to be true
   d. Definitely not true of me

9. A primary reason for my interest in religion is that my church is a congenial social activity.

   a. Definitely not true of me   _____
   b. Tends not to be true
   c. Tends to be true
   d. Definitely true of me

10. Occasionally I find it necessary to compromise my religious beliefs in order to protect my social and economic wellbeing.

   a. Definitely disagree   _____
   b. Tend to disagree
   c. Tend to agree
   d. Definitely agree

11. The primary purpose of prayer is to gain relief and protection.

    a. I definitely agree   _____
    b. I tend to agree
    c. I tend to disagree
    d. I definitely disagree

12. I try hard to carry my religion over into all my other dealings in life.

    a. I definitely disagree   _____
    b. I tend to disagree
    c. I tend to agree
    d. I definitely agree

13. Quite often I have been keenly aware of the presence of God or the Divine Being.

    a. Definitely not true   _____
    b. Tends not to be true
    c. Tends to be true
    d. Definitely true

14. My religious beliefs are what really lie behind my whole approach to life.

    a. This is definitely not so   _____
    b. Probably not so
    c. Probably so
    d. Definitely so

15. The prayers I say when I am alone carry as much meaning and personal emotion as those said by me during services.

    a. Almost never   _____
    b. Sometimes
    c. Usually
    d. Almost always

16. If not prevented by unavoidable circumstances, I attend church.

    a. More than once a week   _____
    b. About once a week
    c. Two or three times a month
    d. Less than once a month

17. If I were to join a church group I would prefer to join (1) a Bible Study group, or (2) a social fellowship.

    a. I would prefer to join (1)   _____
    b. I probably would prefer (1)
    c. I probably would prefer (2)
    d. I would prefer to join (2)

18. Religion is especially important to me because it answers many questions about the meaning of life.

    a. Definitely disagree   _____
    b. Tend to disagree
    c. Tend to agree
    d. Definitely agree

19. I read literature about my faith (or church).

    a. Frequently   _____
    b. Occasionally
    c. Rarely
    d. Never

20. It is important to me to spend periods of time in private religious thought and meditation.

    a. Frequently true   _____
    b. Occasionally true
    c. Rarely true
    d. Never true

Appendix C:

Geriatric Depression Scale

Mood Scale

Instructions: Choose the best answer for how you have felt over the past week.

1. Are you basically satisfied with your life?..............,..............,....yes   no

2. Have you dropped many of your activities and interests?............yes   no

3. Do you feel that your life is empty?..yes   no

4. Do you often get bored?..yes   no

5. Are you in good spirits most of the time?...................................yes   no

6. Are you afraid that something bad is going to
   happen to you...yes   no

7. Do you feel happy most of the time?...yes   no

8. Do you often feel helpless?..yes no

9. Do you prefer to stay at home, rather than going out
   and doing new things?...yes   no

10. Do you feel that you have more problems with memory
    than most?..yes   no

11. Do you think it is wonderful to be alive now?..............................yes no

12. Do you feel pretty worthless the way you are now?......................yes   no

13. Do you feel full of energy?..yes   no

14. Do you feel that your situation is hopeless?...............................yes   no

15. Do you think that most people are better off than you are?............yes   no

Appendix D:

Folstein Mini-Mental State Examination

**FOLSTEIN
MINI-MENTAL STATE®
EXAMINATION
Page 1 of 2**

| One point for each correct answer		
1.	**ORIENTATION**	1 = Correct 0 = Incorrect
	What is the year we are in?	☐
	What season of the year is it?	☐
	What is today's date?	☐
	What day of the week is today?	☐
	What month are we in?	☐
	What state are we in?	☐
	What is your home address?	☐
	What town are we in?	☐
	Can you tell me the name of this place?	☐
	What floor of the building are we on?	☐
	SUBTOTAL CORRECT	☐
2.	**REGISTRATION** Ask the patient if you may test his memory. Then say the names of 3 unrelated objects, apple, penny, table, clearly and slowly, about one second for each. After you have said all 3, ask him to repeat them. This first repetition determines his score (0-3) but keep saying them until he can repeat all 3, up to 6 trials. If he does not eventually learn all 3, recall cannot be meaningfully tested. SCORE (0-3)	☐
3.	**ATTENTION AND CALCULATION** Ask the patient to begin with 100 and count backwards by 7. Stop after 5 subtractions (93, 86, 79, 72, 65). Score the total number of correct answers. If the patient refuses to perform this task, then ask him to spell the word "world" backwards. The score is the number of letters in correct order (e.g. dlrow = 5, dlorw = 3). It is noted that "world" is not used as an alternative upon failure of the patient to perform serial 7's, but only if patient refuses to perform serial 7's. SCORE (0-5)	☐
4.	**RECALL** Ask the patient if he can recall the 3 words you previously asked him to remember. Score 0-3. SCORE (0-3)	☐

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**FOLSTEIN
MINI-MENTAL STATE
EXAMINATION
Page 2 of 2**

5.	**NAMING** a. Show the patient a wrist watch and ask him what it is. b. Repeat for a pencil. SCORE (0-2)	☐
6.	**REPETITION** Ask the patient to repeat this phrase after you — "No Ifs, Ands, or Buts". Allow only one trial. SCORE (0-1)	☐
7.	**3-STAGE COMMAND** Have the patient follow this 3-stage command — "Take that piece of paper in your right hand, fold it in half, and put it on the floor". Score one point for each part correctly executed. SCORE (0-3)	☐
8.	**REACTING** On a blank piece of paper print the sentence "Close your eyes" in letters large enough for the patient to see clearly. Ask him to read it and do what it says. Score 1 point only if he actually closes his eyes. SCORE (0-1)	☐
9.	**WRITING** Give the patient a blank piece of paper and ask him to write a sentence for you. Do not dictate a sentence, it is to be written spontaneously. It must contain a subject and verb and be sensible. Correct grammar and punctuation are not necessary. SCORE (0-1)	☐
10.	**COPYING** On a clean piece of paper, draw intersecting pentagons, each side about 1 inch, and ask him to copy it exactly as it is. All 10 angles must be present and 2 must intersect to score 1 point. Tremor and rotation are ignored. SCORE (0-1)	☐
	TOTAL SCORE	☐
	ASSESS level of consciousness along a continuum **CODE** 1 = Alert 3 = Stupor 2 = Drowsy 4 = Coma	☐
	RATER IDENTIFICATION	

*Folstein, M.F., Folstein, S.E. and McHugh, P.R.: "Mini-Mental State". A practical method for grading the cognitive state of patients for the clinician. Journal of Psychiatric Research, 1975, 12, 189-198.

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CLOSE YOUR EYES
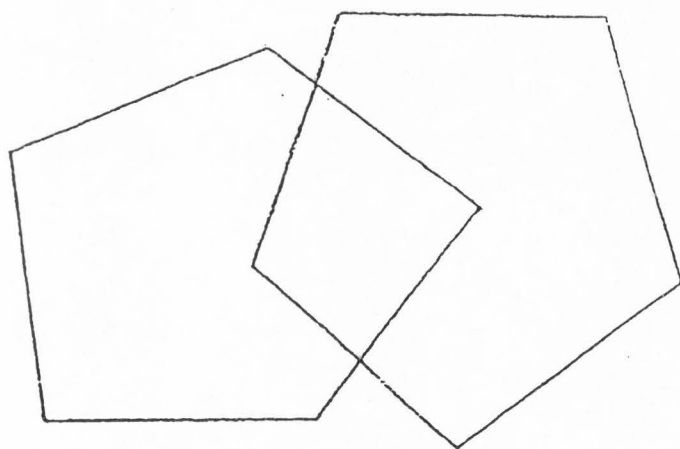
Appendix E:

Multidimensional Health Locus of Control

Health Questionnaire

Indicate your degree of agreement with each statement by placing a number in the blank before it. Use the following scale:

1 = strongly disagree
2 = moderately disagree
3 = disagree
4 = agree
5 = moderately agree
6 = strongly agree

1. _____ If I get sick, it is my own behavior which determines how soon I get well again.

2. _____ No matter what I do, if I am going to get sick, I will get sick.

3. _____ Having regular contact with my physician is the best way for me to avoid illness.

4. _____ If my health worsens, it is up to God to determine whether I will feel better again.

5. _____ Most things that affect my health happen to me by accident.

6. _____ Whenever I don't feel well, I should consult a medically trained professional.

7. _____ I am in control of my health.

8. _____ Most things that affect my health happen because of God.

9. _____ My family has a lot to do with my becoming sick or staying healthy.

10. _____ When I get sick I am to blame.

11. _____ Luck plays a big part in determining how soon I will recover from an illness.

12. _____ God is directly responsible for my health getting better or worse.

13. _____ Health professionals control my health.

14. _____ My good health is largely a matter of good fortune.

15. _____ The main thing which affects my health is what I myself do.

16. _____ Whatever happens to my health is God's will.

17. _____ If I take care of myself, I can avoid illness.

Health Questionnaire, continued

1 = strongly disagree
2 = moderately disagree
3 = disagree
4 = agree
5 = moderately agree
6 = strongly agree

18. _____ When I recover from an illness, it's usually because other people (for example, doctors, nurses, family, friends) have been taking good care of me.

19. _____ No matter what I do, I'm likely to get sick.

20. _____ Whether or not my health improves is up to God.

21. _____ If it's meant to be, I will stay healthy.

22. _____ If I take the right actions, I can stay healthy.

23. _____ Regarding my health, I can only do what my doctor tells me to do.

24. _____ God is in control of my health.

Appendix F:

State-Trait Anger Expression Inventory-2

STAXI-2™

Item Booklet (Form HS)

Instructions

In addition to this Item Booklet you should have a STAXI-2 Rating Sheet. Before beginning, enter your name, gender, and age; today's date; years of education completed, your marital status, and your occupation in the spaces provided at the top of the STAXI-2 Rating Sheet.

This booklet is divided into three Parts. Each Part contains a number of statements that people use to describe their feelings and behavior. Please note that each Part has *different* directions. Carefully read the directions for each Part before recording your responses on the Rating Sheet.

There are no right or wrong answers. In responding to each statement, give the answer that describes you best. DO NOT ERASE! If you need to change your answer, mark an "X" through the incorrect response and then fill in the correct one.

<div>

Examples

1. ① X ● ④

2. ① ● ③ ④

</div>

9 8 7 6 5 4 3 2 1   Reorder #RO-4352   Printed in the U.S.A.

Part 1 Directions

A number of statements that people use to describe themselves are given below. Read each statement and then blacken the appropriate circle on the Rating Sheet to indicate how you feel *right now*. There are no right or wrong answers. Do not spend too much time on any one statement. Mark the answer that *best* describes your *present feelings*.

Fill in ① for *Not at all*   Fill in ② for *Somewhat*   Fill in ③ for *Moderately so*   Fill in ④ for *Very much so*

How I Feel Right Now

1. I am furious
2. I feel irritated
3. I feel angry
4. I feel like yelling at somebody
5. I feel like breaking things
6. I am mad
7. I feel like banging on the table
8. I feel like hitting someone
9. I feel like swearing
10. I feel annoyed
11. I feel like kicking somebody
12. I feel like cursing out loud
13. I feel like screaming
14. I feel like pounding somebody
15. I feel like shouting out loud

Part 2 Directions

Read each of the following statements that people have used to describe themselves, and then blacken the appropriate circle to indicate how you *generally* feel or react. There are no right or wrong answers. Do not spend too much time on any one statement. Mark the answer that *best* describes how you *generally* feel or react.
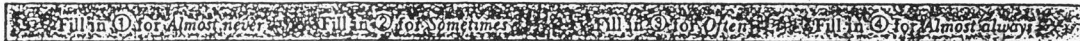
| Fill in ① for *Almost never* | Fill in ② for *Sometimes* | Fill in ③ for *Often* | Fill in ④ for *Almost always* |

How I Generally Feel

16. I am quick tempered
17. I have a fiery temper
18. I am a hotheaded person
19. I get angry when I'm slowed down by others' mistakes
20. I feel annoyed when I am not given recognition for doing good work
21. I fly off the handle
22. When I get mad, I say nasty things
23. It makes me furious when I am criticized in front of others
24. When I get frustrated, I feel like hitting someone
25. I feel infuriated when I do a good job and get a poor evaluation

Part 3 Directions

Everyone feels angry or furious from time to time, but people differ in the ways that they react when they are angry. A number of statements are listed below which people use to describe their reactions when they feel *angry* or *furious*. Read each statement and then blacken the appropriate circle to indicate how *often* you *generally* react or behave in the manner described when you are feeling angry or furious. There are no right or wrong answers. Do not spend too much time on any one statement.

Fill in ① for *Almost never*   Fill in ② for *Sometimes*   Fill in ③ for *Often*   Fill in ④ for *Almost always*

How I Generally React or Behave When Angry or Furious...

26. I control my temper
27. I express my anger
28. I take a deep breath and relax
29. I keep things in
30. I am patient with others
31. If someone annoys me, I'm apt to tell him or her how I feel
32. I try to calm myself as soon as possible
33. I pout or sulk
34. I control my urge to express my angry feelings
35. I lose my temper
36. I try to simmer down
37. I withdraw from people
38. I keep my cool
39. I make sarcastic remarks to others
40. I try to soothe my angry feelings
41. I boil inside, but I don't show it
42. I control my behavior
43. I do things like slam doors
44. I endeavor to become calm again
45. I tend to harbor grudges that I don't tell anyone about
46. I can stop myself from losing my temper
47. I argue with others
48. I reduce my anger as soon as possible
49. I am secretly quite critical of others
50. I try to be tolerant and understanding
51. I strike out at whatever infuriates me
52. I do something relaxing to calm down
53. I am angrier than I am willing to admit
54. I control my angry feelings
55. I say nasty things
56. I try to relax
57. I'm irritated a great deal more than people are aware of

Appendix G:

Visual Analogue Scale of Anger

Please place an "X" on the line below at the point which best represents your <u>current</u> level of anger.

My current level of anger is:

_____

Not   Angry as I
Angry   have ever been

Appendix H:

Regression Table

Table 7

Regression Summary Table for Dependent Psychophysiological Measures of Reactivity

Dependent Variable	Model		Sum of squares	Degrees of freedom	Mean square	F	Sig.
SBP		Regression	10932.88	3	3644.29	5.03	.00[a]
		Residual	51474.00	71	724.99		
		Total	62406.87	74			
State anger	1	Regression	530.44	3	176.82	1.93	.13[a]
		Residual	6511.10	71	91.71		
		Total	7041.55	74			
HR	1	Regression	999.20	3	333.07	1.82	.15[a]
		Residual	12981.52	71	182.84		
		Total	13980.71	74			
Current anger	1	Regression	1507.32	3	502.44	.98	.41[a]
		Residual	36372.46	71	512.29		
		Total	37879.79	74			
DBP	1	Regression	1052.58	3	350.86	5.03	.21[a]
		Residual	16078.48	71	226.46		
		Total	17131.06	74			

[a] Predictors: (Constant), mhlc unidimensional scale, ROS, interaction ros x mhlc unidimensional scale.