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Religion, Spirituality, and Psychological Distress in Cardiovascular Disease

A Thesis

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Dedications

To my parents,
for their encouragement of my educational endeavors,
and to Joel,
for his patience, support, and love.

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Table of Contents

List of Tables

List of Figures

Abstract

Religion, Spirituality, and Psychological Distress in Cardiovascular Disease

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In recent years, mounting evidence has pointed to a relationship between religion, spirituality, and health. This has been especially notable in individuals with cardiovascular disease. While religion and spirituality have been studied in various ways with this disease group, a multidimensional approach to measuring religion and spirituality has yet to occur. This study implemented a multidimensional measure of religious and spiritual constructs with a sample of cardiac patients in a cross-sectional study of religion and spirituality, psychological distress risk factors, and health status. Results indicated significant associations between religious support and both depression and anxiety, as well as between organized religiousness and systolic blood pressure. Other religious/spiritual variables of religious preference, history, private religious practices, forgiveness, and commitment were implicated in the results, along with contrasts involving age, race, employment, and marital status. The results of this study lend support to previous research that has highlighted the significance of religious attendance and religious social support as indicators of better cardiovascular health.

CHAPTER 1: INTRODUCTION

Over the past 300 years, religion has gradually become separated from the practice of medicine, despite having been tied to it for millennia (Koenig, 2000). From prehistoric Egyptian times, through Mesopotamian and Indus Valley civilizations over 3000 years ago, continuing on through ancient Greece and the Roman Empire, until the Renaissance and the Enlightenment, religion was intimately connected with both mental and physical health and the treatment of illnesses. Within the last few centuries, religion and medicine ultimately became severed, at least professionally and in Western cultures. Mental health also became disassociated with religion, except where negative implications were concerned. For example, Sigmund Freud documented the negative implications of religious beliefs and rituals on mental health and in more recent times psychologists such as Albert Ellis have also derided religion as unhealthful (Koenig, 1997, chap. 3).

In 2000, Koenig reviewed a number of studies lending support for religion's deleterious association with physical health. The majority of these studies, however, had a tendency to examine religion insofar as select extreme groups were concerned, particularly those whose religious beliefs include the eschewal of secular medical practices such as blood transfusions and vaccinations or who literally believe that prayer can cure all ills. There has been resurgence, however, in the recent decades leading into these early years of the 21st Century, of interest in religion (and in the wider area of spirituality) and the scientific examination of the relationships—positive, negative, and nonexistent—that these have with health. The present study was designed to forward research in this area by measuring religion and spirituality in a more thorough manner

than has been accomplished before in order to unearth associations with psychological distress and physical health parameters in patients with cardiovascular disease.

Religion and Spirituality Defined

The majority of people in the world, and certainly the majority of people in the United States, has some type of religious or spiritual belief (Koenig, 1997). Before any further discussion about religion and spirituality can occur, however, there must be some clarity as to what these terms refer and how each is used in the literature. Sometime these terms have been used to refer to essentially the same construct while at other times they denote very different ideas altogether. For the most part, the research so far executed in this area has dealt with religion rather than spirituality, and although the latter is increasingly becoming more common in the literature, the use of the term "religion" in this current work is reflective its popular usage in research. Although many definitions of religion highlight rituals and social aspects, while definitions of spirituality usually consist of a belief in a higher power (Martin & Carlson, 1988), most of these definitions are not satisfactory. Perhaps the most helpful definitions of religion and spirituality are those by Koenig, McCullough, and Larson (2001b, chap. 1):

> Religion is an organized system of beliefs, practices, rituals, and symbols designed (a) to facilitate closeness to the sacred or transcendent (God, higher power, or ultimate truth/reality) and (b) to foster an understanding of one's relationship and responsibility to others in living together in a community. Spirituality is the personal quest for understanding answers to ultimate questions about life, about meaning, and about relationship to the sacred or transcendent,

> which may (or may not) lead to or arise from the development of religious rituals and the formation of community (p. 18).

With these definitions, spirituality and religion are not purely independent constructs but have the capacity to overlap one another to varying degrees within an individual person and amongst groups of individuals. For example, participants in one study were asked to self-describe themselves as religious, spiritual, or both (Woods & Ironson, 1999). The 60 participants in this study were evenly made up of individuals with cancer, HIV, or myocardial infarction. The slight majority of participants (43%) described themselves as spiritual, while 37% said they were religious and 20% found the dual description to fit them best. Cancer patients were fairly evenly divided between these three endorsements, while 70% of those with HIV described themselves as spiritual. On the other hand, 65% of cardiac patients referred to themselves as religious.

As is evident from the preceding example, religion and spirituality are distinct but often related. Because of the potential for overlap, as well as the way in which the two constructs have been measured in the literature, spirituality and religion are often grouped together. This mercurial state of affairs creates some confusion for terminology. Therefore, unless specifically referring to solely religion or solely spirituality, a combined reference (e.g., religion/spirituality) will be used throughout this work, so as to more fully encompass any potential linkages between religion and spirituality and other variables.

Measurement of Religion and Spirituality

For many years, the measurement of religion was scant and localized to certain research areas, such as in social psychology with investigations of prejudice. Spirituality

appears to have been studied even less. Clinical psychology, psychiatry, family practice, and gerontology were fields recently cited as having produced very few religion/spirituality-related studies (Hill & Pargament, 2003). While there are speculative reasons for why such a lack of inquiry exists in these fields (e.g., religion and spirituality are not important constructs for these fields to study, are not applicable to scientific study, and are not important concepts in modern times), one problem that perhaps has held back research on religion and spirituality is the difficulty in adequately measuring these constructs. In a good number of the studies that attempted measurement, religion (and more rarely spirituality) was often included as a one-item question in a battery of demographic items. The majority of these items either concerned denominational affiliation or frequency of religious service attendance (Koenig, 2001a). These brief measures were meant to be global indicators of religiousness and spirituality. Despite the unidimensional nature, though, a simple measure (e.g., religious involvement) was still found to significantly predict lower mortality (McCullough, Hoyt, Larson, Koenig, & Thoresen, 2000).

The prospect of a legitimate association between religion and health has led to the development of less restricted measures of religion and also of spirituality. Within psychology and other fields, religion and spirituality have begun to be considered less in terms of mere religious affiliation or participation, but more as intricate and multifaceted concepts. In the past two decades, a number of measures have been developed in order to elaborate on certain facets thought to be inherent to religion and spirituality. These include scales measuring closeness to God, religious orientation or motivation, religious

coping and support, and religious and spiritual struggle; each of these has been associated significantly with health outcome (Hill & Pargament, 2003).

Other measures have been developed that focus on other aspects of religion: religious belief, nonorganizational religiosity, subjective religiosity, religious commitment, religious well-being, religious history, religious maturity, and faith-specific religiosity (e.g., Jewish, Hindu, Muslim, Buddhist). Still others have been created for certain factors of spirituality, such as spiritual maturity, spiritual well-being, spiritual orientation, spiritual experiences, spiritual involvement, and spiritual beliefs (Koenig et al., 2001b, chap. 33). While beyond the scope of the present paper to delve into each of these measure types, there are very few that take a multidimensional approach. Using more than one measure to achieve multifaceted measurement of religion and spirituality is an option, but one that could lead to overlapping item content as well as cause the measure to be unnecessarily long. This latter issue is of special concern in medical populations, where individuals are often in poor health and brevity of questionnaires is crucial in decreasing demand on participants. Thus, the ability to measure at one time many dimensions of religion and spirituality in a succinct manner is a reasonable goal of the science.

The ability to measure different dimensions of religion and spirituality as related to health would allow for a better sense of what aspects are involved in such relationships. A recent review of the empirical literature on religion, spirituality, and health noted a range in the quality and strength of findings (Powell, Shahabi, & Thoresen, 2003). Some of the better evidence encountered was for religion or spirituality to protect against cardiovascular disease. Another review of the relationship between religion and

physical health also highlighted cardiovascular problems, particularly heart disease, blood pressure, and stroke (Koenig, McCullough, & Larson, 2001a). For instance, in terms of religious denomination, some studies found that Jews were at higher risk for heart disease than other denominations. In 75% of the studies focusing on religiousness and heart disease, those who were more religious had less heart disease and were less likely to die from heart disease than those who were less religious. Psychosocial-behavioral interventions incorporating a religious/spiritual element were found to have a beneficial impact on cardiovascular health status. The majority of studies involving measures of religiousness and blood pressure also found that those who were more religious tended to have lower blood pressure, especially diastolic blood pressure. As with heart disease interventions, most spiritual/religious interventions for blood pressure were successful in lowering it. While fewer studies have been conducted on religion and stroke, a trend appeared suggesting that greater attendance at religious services predicted decreased chance of suffering stroke.

Continuing to decipher how religion and spirituality relate to cardiovascular disease appears important, not just because of the encouraging support suggested by existing findings, but also because of the implications further findings might have for the prevention and treatment of cardiovascular disease. Thus, cardiovascular disease lends itself well as an example through which the association between religion, spirituality, and health can be examined.

Cardiovascular Disease

Cardiovascular disease encompasses a number of diagnoses, including coronary heart disease, hypertension, and stroke, the three most common conditions. Coronary

heart disease, the leading cause of death of American adults, is the result of atherosclerosis, or the build-up of fatty substances in the arteries, which decreases blood-flow to the heart. Progression of this accumulation can lead to severe complications and cardiac events. Angina pectoris (chest pain) can result from atherosclerosis and can accompany myocardial ischemia, a condition whereby the heart cannot function efficiently due to the decrease in blood flow. When myocardial ischemia occurs frequently, cardiac rhythm can be altered and may lead to sudden cardiac death. Myocardial infarction (heart attack) occurs when there is severe ischemia and/or there is arterial blockage from arterial plaque that has broken away from the arterial wall (Suchday, Tucker, & Krantz, 2002).

Problems can also occur when appropriate blood flow to the brain is compromised, most frequently in the event of stroke. Similar to insufficient blood flow to the heart, insufficient blood flow to the brain accounts for approximately 80% of strokes, with the remainder caused by hemorrhage (when a blood vessel breaks, resulting in excessive bleeding in the brain region; Koenig, McCullough, & Larson, 2001b, chap. 18). Not only is stroke the third leading cause of death in Americans, but it is also a leading cause of disability in U.S. adults (American Stroke Association, 2002a).

Hypertension refers to chronic high blood pressure and is related to coronary heart disease and stroke in that it increases the risk of both. One fourth of adult Americans have high blood pressure, although many individuals do not realize that they are hypertensive (American Heart Association, 2002a). Unfortunately, hypertension has earned the name of “the silent killer” since it often is not diagnosed or treated until advanced stages or after a related cardiac event (e.g., stroke, myocardial infarction;

Koenig, McCullough, & Larson, 2001b, chap. 17). In individuals with early-stage or borderline hypertension, the condition occurs because of increased outflow of blood from the heart; however, in individuals with later-stage hypertension, blood flow from the heart is normal but there is greater vascular resistance. Often there is no known underlying cause for hypertension, but there are many influential factors that may contribute to the condition (Suchday, Tucker, & Krantz, 2002). Obesity, high sodium intake, high alcohol intake, physical inactivity, and stress are all risk factors for hypertension, as are age, heredity, and race. African Americans in particular are at greater risk for hypertension than other racial groups (American Heart Association, 2002a).

Clearly, cardiovascular diseases rank amongst the highest health problems in this country. The rates of mortality and disability are significant in relation to other diseases and the cost in health care resources, not to mention personal impact, is remarkable. Sadly, the fallout from cardiovascular events and complications is often irreversible and full recovery is rarely a realistic goal. In order to arrest the continuance of these statistics, identifying and understanding risk factors to which cardiovascular disease is attributed is crucial. While fixed risk factors like race, gender, and age can contribute to the development of cardiovascular disease, other behavioral and psychological factors, often modifiable, have been implicated as well.

Risk Factors for Cardiovascular Disease

Health Behaviors

Smoking

Over the last half century, tobacco smoking has been causally linked to a myriad of diseases, including cardiovascular disease. Smoking is estimated to be implicated in approximately one third of cases of coronary heart disease; stroke and hypertension are also classified as smoking-related diseases (Grunberg, Brown, & Klein, 1997). Thus, smoking behavior is certainly a risk factor that can be targeted by smoking prevention programs as well as smoking cessation programs for those already engaging in the habitual behavior. Furthermore, smoking increases the risk not only of first myocardial infarction, but also the recurrence of subsequent infarctions. When smoking behavior does cease in individuals who have experienced their first heart attack, they enjoy a better prognosis than those who do not stop smoking (Johnston, 1997).

Diet

The diet of an individual also can be implicated in cardiovascular disease. Coronary heart disease is associated with the presence of high levels of low-density lipoprotein cholesterol and low levels of high-density lipoprotein in the blood. These blood levels comprise high serum cholesterol and are associated with a diet of foods high in cholesterol and saturated fatty acids (Koenig, McCullough, & Larson, 2001b, chap. 16). Diets high in salt increase the risk of the development of hypertension, primarily through increases in blood volume by the kidneys when there is excessive salt intake. Interestingly, salt intake can increase during times of stress, exacerbating the problem (Suchday, Tucker, & Krantz, 2002). Although caffeine has many metabolic effects, its

implication in the development of heart disease has not been confirmed. The American Heart Association stated that caffeine consumption in moderate amounts likely does not have adverse health effects (American Heart Association, 2005).

Exercise

Sedentary lifestyles have also been identified as a risk factor for cardiovascular disease. The combination of a diet high in fatty food and inactivity is one that is very common in the United States and consequently obesity is also a major health problem, with roughly one quarter of the US population being overweight. Not surprisingly, then, obesity is associated with hypertension and coronary heart disease. An active lifestyle with regular physical exercise not only can reduce the risk of cardiovascular disease (as well as other diseases), regular exercise can also assist in managing extant cardiovascular conditions as well as improve psychological well-being (Koenig, McCullough, & Larson, 2001b, chap. 24).

Alcohol abuse

In recent years, there have been reports advocating the intake of modest amounts of alcohol (namely, wine) in order to gain cardiovascular benefits (American Heart Association, 2002b). Regardless of the latest news on this front, excessive drinking and alcohol abuse are linked to cardiovascular disease. Alcohol abuse is thought to increase an individual's vulnerability to changes in cardiac rhythm, resulting in coronary death. Excessive drinking of alcohol is also implicated in stroke (from hypertension induced by alcohol) and congestive heart failure (Koenig, McCullough, & Larson, 2001b, chap.16).

While these risk factors working alone are concerning enough, the serious negative impact on cardiovascular functioning is intensified when more than one is

present with another. Risk of developing cardiovascular disease is increased with the addition of other risk factors. This is not only true of combinations of fixed and modifiable health behavior risk factors, but also when psychological distress risk factors are included (Suchday, Tucker, & Krantz, 2002).

Psychological Distress

Hostility

Hostility is perhaps the most studied psychological risk factor for cardiovascular disease. In the latter half of the 20th Century, a cluster of behaviors emerged that cardiologists viewed as associated with cardiovascular disease. This behavioral cluster, known as Type A coronary-prone behavior pattern (TABP), was identified by Friedman and Rosenman (1959) as encompassing extreme forms of competitiveness, striving towards goal-attainment, desire of recognition and advancement, time-pressured accomplishment and performance, and physical and mental alertness. Over the years, a number of large studies endeavored to document this relationship (e.g., the Western Collaborative Group Study (Ragland & Brand, 1988; Rosenman, Brand, Jenkins, Friedman, Straus, & Wurm, 1975), the Framingham Study (Haynes, Feinleib, Levine, Scotch, & Kannel, 1978a; Haynes, Levine, Scotch, Feinleib, & Kennel, 1978b), the Honolulu Heart Program (Cohen & Reed, 1985), and the British Regional Heart Study (Johnston, Cook, & Shaper, 1987)), but results were mixed for a clear association between TABP and cardiovascular disease. In fact, negative findings emerged, most notably those of the Multiple Risk Factor Intervention Trial (MRFIT; Shekelle et al., 1985).

Conflicting findings motivated researchers to look more closely at TABP and to tease out particular subcomponents of the pattern that might more coercively drive the association between such a behavior pattern and cardiovascular disease. Theodore M. Dembroski was arguably the first to leave global TABP behind and to concentrate on the subcategory of hostility, particularly the potential for hostility (Siegman, 1994). When the MRFIT data were reanalyzed using potential for hostility as a risk factor, the results indicated that while TABP continued to not be a significant predictor of coronary heart disease, potential for hostility was significantly predictive of outcome (Dembroski, MacDougall, Costa, & Grandits, 1989). Evidence accumulated suggesting that hostility was the key component in the TABP connection (Johnston, 1993).

While results of studies linking hostility to cardiovascular disease risk are certainly not always in consensus, meta-analysis has found that hostility does carry independent ability to predict coronary heart disease (Miller, Smith, Turner, Guijarro, & Hallet, 1996). This appears to be particularly true when hostility is measured by structured interview. Self-report hostility measures also capture the connection, but with less strength; however, self-reported hostility was found to be predictive of all-cause mortality in the meta-analysis. Evidence has continued to build in support of hostility's power as a predictor. Older men participating in the Normative Aging Study who received high scores for hostility on the Cook-Medley Hostility Scale were more likely to be at risk of poorer cardiovascular health as measured by associated risk factors such as body mass index, serum triglycerides, insulin levels, and total calorie intake (Niaura et al., 2000). Anger expression, a part of hostility, was also specifically investigated in the Normative Aging Study (Kawachi, Sparrow, Spiro, Vokonas, & Weiss, 1996). Men with

greater anger expression were more likely to have elevated levels of coronary heart disease at follow-up. Likewise, in the Atherosclerosis Risk in Communities study, older men and women who were more prone to anger were also at greater risk of coronary heart disease (Williams et al., 2000).

Depression

There is quite substantial evidence for a link between depressive symptoms and risk for cardiovascular disease morbidity and mortality (Carney & Freedland, 2003). In some noteworthy prospective studies, depression has been able to independently predict incidence of and death from cardiovascular ailments. Results from the National Health Examination Follow-Up Study found that those who had depressed affect at baseline were 50% more likely to die from heart disease by the 12-year follow-up point (Anda et al., 1993). This same study also found that those who endorsed moderate hopelessness at baseline had a 60% greater risk of death from heart disease on follow-up while those with severe hopelessness had a 110% risk of mortality from heart disease. Another prospective study in Finland found that men who initially were assessed for hopelessness had 20% greater measurable atherosclerosis at 4-year follow-up than men who did not endorse hopelessness; the former group was also at greater risk for myocardial infarction (Everson et al., 1996; Everson et al., 1997). Similarly, depression was found to be an independent risk factor for coronary artery disease in a cohort of male medical students (Ford et al., 1998). In a Canadian study of individuals who were diagnosed with myocardial infarction, of those who were depressed at baseline, 17% had died at six-month follow-up, whereas only 3% of the nondepressed participants died within six-months (Frasure-Smith, Lesperance, & Talajic, 1993). A review by Wulsin and Singal

(2003) of prospective studies examining depression as a risk factor for coronary disease concluded that there was strong evidence that depressive symptomatology indeed does serve as an independent predictor. In the National Health and Nutrition Examination Survey Epidemiological Followup Study, depression at baseline was found to predict later emergence of both stroke and hypertension at 16-year (average) follow-up (Jonas & Lando, 2000; Jonas & Mussolino, 2000). A recent review of prospective studies examining depression as a risk factor for stroke also supported the connection with depression (Ramasubbu & Patten, 2003).

Anxiety

Similar to depression, anxiety has been associated with increased risk of development of cardiovascular disease (Sheps & Sheffield, 2001). Among other variables, greater anxiety was significantly correlated with higher ambulatory blood pressure and heart rate in individuals who were monitored for emotional responsivity and physiological reactivity during a 24-hour period (Carels, Blumenthal, & Sherwood, 2000). Poorer vagal control of the heart (i.e., heart rate variability) has been implicated in cardiovascular disease mortality; anxiety has been found to have a significant inverse relationship with vagal control in healthy participants (Watkins, Grossman, Krishnan, & Sherwood, 1998). From data collected over 32 years in the prospective Normative Aging Study, male veterans who endorsed two or more symptoms of anxiety at baseline were significantly more likely to die of coronary heart disease, especially by sudden cardiac death, in comparison to those who reported no anxiety symptoms (Kawachi, Sparrow, Vokonas, & Weiss, 1994). Men experiencing high levels of stress have been found to be at a 50% higher risk of sustaining myocardial infarction than men with lower levels of

stress (Rosengren, Tibblin, & Wilhelmsen, 1991), although there have been conflicting findings in this regard. For example, Macleod et al. (2002) in their prospective study did not find men with perceived high levels of stress at baseline to have significantly more ischemia over the study's 21 years of follow-up.

Reactivity to psychological stress, including anxiety, was found to be more prominent in individuals who were healthy but salt-sensitive (a genetic vulnerability for hypertension) in contrast to control participants (Buchholz, Schorr, Turan, Sharma, & Deter, 1999). Such heightened physiological reactivity may enhance the development of hypertension in those sensitive to salt; similar findings have been noted for those already diagnosed with hypertension (Raikkonen, Hautanen, & Keltikangas-Jarvinen, 1996). In a prospective study using a US national sample, Jonas & Lando (2000) found that anxiety at baseline was predictive of hypertension, even at the 22-year follow-up.

Mechanisms between Risk Factors and Disease Development

How might all of these risk factors influence the development of cardiovascular disease and promote the incidence of cardiovascular events? The answers are not clear, but there are a number of hypotheses as to what occurs.

Theories

Most discussion of cardiovascular disease and risk factors describes at some point the involvement of cardiovascular reactivity and the stress response. One of the basic physiological processes implicated in the development of cardiovascular disease is the fight-or-flight response. The fight-or-flight response is an autonomic process that occurs when an organism is confronted with a stressor or threat. The body of the organism, after appraising the situation as threatening, prepares itself to either attack the threat directly or

flee and avoid the threat. In either case, the body experiences a series of physiological changes that rapidly assemble the necessary functions in order to approach or avoid the threat. In the human experience, this rapid response can occur for both physically threatening and emotionally threatening situations (Auerbach & Gramling, 1998).

Through a chain of reactions commencing in the brain (notably in the locus ceruleus), regions of the body, particularly the muscles of vital organs such as the heart, blood vessels, stomach, and intestines, are activated. Also activated is the adrenal medulla, which secretes considerable amounts of epinephrine or adrenaline. The hypothalamic-pituitary-adrenal (HPA) axis also becomes engaged, with the hypothalamus emitting corticotropin releasing hormone which, when encountering the pituitary gland, causes corticotropin to be secreted. As the corticotropin travels to the adrenal cortex via blood vessels, glucocorticoids are released (Steptoe, 1997). This is a basic description of the mechanism by which blood is relegated to the most vital organs of the body and muscle function is empowered through greater access to glucocorticoids so that the fight-or-flight response appears.

The fight-or-flight response has great implications for the cardiovascular system since the gross outcome of the myriad discrete physiological processes of the response has the effect of increasing heart rate, blood pressure, and coronary artery tone. Serum cholesterol and blood lipids levels also change during the response; blood platelets gather together more easily and blood has a tendency to clot more during the response. While the evolutionary benefits of such an immediate physiological response are apparent, problems occur when the response is engaged too frequently and/or for long periods of time. The constant or sustained activation of the fight-or-flight response does not allow

the body to revert back to normal functioning and can lead to impairment of body tissues and physiological systems (e.g., peptic ulcers in the gastrointestinal system). In the case of cardiovascular functioning, the over-extension of the stress response, with its heightened level of lipids and platelet aggregation in the blood, increases the chance that cardiac arrhythmias and decreased heart rate variability will occur (Koenig, 2001b).

There are a number of models that attempt to explain how the physiological stress response is activated and why it may be more problematic for certain individuals and not for others. These models have been proposed in great part to understand the pathways through which hostility may impact the cardiovascular system. Perhaps the most popular view is that depicted by the psychophysiological reactivity model (Williams, Barefoot, & Shekelle, 1985). Essentially, this model posits that certain individuals are prone both to experience anger and to be hypervigilent towards threats. This heightened sensitivity to detect prospective mistreatment and the tendency towards anger are accompanied by higher physiological reactivity, such as raised blood pressure. The increased engagement of this high reactivity can then be the basis for negative cardiovascular effects. Notably, the psychophysiological reactivity model is based primarily on the individual's psychological and physiological reaction to the environment, a basis different from the constitutional vulnerability model (Krantz & Durel, 1983) which advances that the emergence of hostility is biologically based, with psychological reactions merely a consequence of underlying biology (e.g., sympathetic nervous system response differences).

Another model is the transactional model, which blends the psychophysiological reactivity model with the psychosocial vulnerability model (Smith & Pope, 1990).

Psychosocial vulnerability addresses the coupling of hostility with negative psychosocial factors such as interpersonal conflict and poor social support. The transactional model allows for interplay between the individual who is prone to view the world with mistrust and skepticism and his or her interactions with others. These interactions, by virtue of the cynical perception of others, are more likely to be negative, even aggressive. For this reason, social support probably becomes reduced and interpersonal strife becomes greater. A reaffirming cycle is advanced, with the hostile individual on the lookout for negative interactions and, when they occur, for this to confirm his or her viewpoint further. In doing so, the body undergoes heightened physiological arousal, increasing the risk for cardiovascular disease. Health behavior is the basis for yet another model explaining the association between hostility and cardiovascular disease (Leiker & Hailey, 1988). Hostile individuals may be more prone to engage in behaviors detrimental to cardiovascular health, such as smoking and alcohol abuse. What is evident from the above models is that any or all might be active within any given individual; the models are not necessarily mutually exclusive (Smith, 1994).

Kop (1999) proposed a pathophysiological model of psychological risk factors for coronary artery disease. Three psychological categories are identified in the model: acute (anger, mental activity), episodic (depression, exhaustion), and chronic (hostility, low socioeconomic). These psychological factors are influenced by other risk factors, such as unhealthful behaviors, environmental variables, and genetic predispositions. There are multiple pathways throughout the model and only the more prominent will be highlighted here. In the case of chronic psychological factors, these can impact both acute and episodic factors, while also having more direct effects. For example, hostility

can lead to increased sympathetic nervous system activity which then can lead to cardiac events and disease. Another example is that of anger, an acute factor which may or may not be preceded by the chronic factor of hostility. Anger can lead to changes in physiological response (e.g., increased heart rate and blood pressure), which then may create cardiac effects, such as electrical instability. This in turn may cause arrhythmia and potentially a cardiac event, such as sudden cardiac death. A third case in the model can be exemplified by the episodic factor of depression. Depression can lead to changed physiological response such as sympatho-vagal imbalance, neurohormonal changes, and a pro-coagulant state, thus enhancing the potential for a cardiac event.

Although the models described above assist in conceptualizing the pathways through which psychological distress and other risk factors may affect physiological functioning and enhance disease states, empirical evidence is necessary in order to understand real associations between variables and to test parts of these models.

Empirical Findings of Risk Factors and Cardiovascular Disease

A number of studies illustrate the associations between various risk factors and cardiovascular disease, and have even demonstrated how risk factors can be interrelated. For example, data from the Edinburgh Artery Study demonstrated that psychological distress and health behaviors can be joint factors in cardiovascular health (Whiteman, Deary, & Fowkes, 2000). Hostility was significantly associated with greater smoking and alcohol use in this community sample and was also related to increased severity of peripheral arterial disease, a predictor of cardiovascular events and mortality.

Many more studies, however, have examined risk factors under experimental conditions as well as cross-sectionally. One of the most popular methods of doing this is

to see how physiological reactivity differs between individuals along certain risk factors. For example, hostility and lack of social support are psychosocial features that are implicated in perceived stress and ability to cope with that stress. If an individual maintains a hostile perspective or has few social connections to assist in managing stress, then the individual's physiological stress response may occur more frequently and/or be sustained longer. The response activation is thought to eventually take its toll and increase the likelihood of cardiovascular disease (Smith, Limon, Gallo, & Ngu, 1996). For the hostile individual, encounters with others most likely will be antagonistic as opposed to agreeable, a situation which only fuels the mistrust, cynicism, and unhelpfulness towards others that is characteristic of hostility. Thus, the risk factors of hostility and low social support are often coupled (Costa, Stone, McCrae, Dembroski, & Williams, 1987) and also have been correlated with other risk factors, such as depression (Raynor, Pogue-Geile, Kamarck, McCaffery, & Manuck, 2002). Given these related risk factors, one would expect to see heightened physiological response and indeed this has been the subject of a number of studies.

When individuals are provoked or harassed during performance of mental tasks in the laboratory, those with greater hostility are more likely to have raised diastolic and systolic reactivity. This relationship is particularly strong for hostile individuals in interpersonal situations (Houston, 1994). Men high in hostility and subjected to interpersonal stress (e.g., harassment) during their performance on an anagram task had both higher heart rate, blood pressures, and forearm vascular resistance than their low-hostility counterparts (Suarez, Kuhn, Schanberg, Williams, & Zimmerman, 1998). In addition to cardiovascular reactivity, these high-hostility participants also were found to

have increased neuroendocrine reactivity during harassment. Another study demonstrated that Caucasian undergraduate women with greater antagonism and cynical hostility had higher systolic blood pressure and heart rate during laboratory discussion of contentious topics designed to create interpersonal stress (Powch & Houston, 1996). Similar results linking hostility with increased blood pressure and smaller increases in cardiac output have been found for both men and women (Davis, Matthews, & McGrath, 2000). Using healthy undergraduate students, Guyll and Contrada (1998) found that hostility was correlated with increased heart rate and diastolic blood pressure in men. Ambulatory blood pressure monitoring and diary reports also indicated that higher systolic blood pressure was associated with greater hostility scores during social interactions, a finding especially true of men in the study.

While hostility is related to enhanced physiological reactivity, acute psychological stress (e.g., anxiety) can directly increase reactivity. For women, cognitive tasks and mental stress tests often is accompanied by changes in cardiovascular neuroendocrine activity, with increases in blood pressure, heart rate, and number of natural killer cells (Benschop et al., 1998). Young men also appear to show similar reactivity. Men who had greater systolic blood pressure reactivity to playing video games were more likely to have elevated systolic blood pressure at follow-up five years later. For African American men in particular, heightened diastolic blood pressure reactivity to the video game was predictive of hypertension development at follow-up (Markovitz, Raczynski, Wallace, Chettur, & Chesney, 1998). Depressed mood also appears to be related to physiological reactivity. Greater depressed mood in health men and women was correlated with lower heart rate variability during a cognitive performance task than those endorsing less

depressed mood (Hughes & Stoney, 2000). Likewise, heart rate variability was decreased in coronary artery disease patients who were more depressed (Krittayaphong et al., 1997).

Theoretical Pathways between Mental Health, Cardiovascular Health, and Religion and Spirituality

Given the presented various risk factors for cardiovascular disease and how these may impact physiological functioning, how might religion and spirituality relate to these risk factors and the development of cardiovascular disease? Just as there are different hypothesized mechanisms for how health behaviors and psychological risk factors work to either promote or hinder health, so too are religion and spirituality hypothesized to work in varying ways.

The Psychology of Religion/Spirituality

Psychologically, religious and spiritual beliefs can be understood as being a part of a person's cognitive schema and how he or she views the world. Thus, how people form ideas and impressions of the world, how they appraise and interpret the world, is often informed and influenced by religious beliefs (Carone and Barone, 2001). Religious beliefs have been conceptualized as cognitive schema and, as with other schema, involve cognitive heuristics (e.g., cognitive shortcuts) based on religious beliefs. Humans often cannot objectively and thoroughly analyze every piece of information in their daily lives, so relying on belief systems to quickly interpret the information and place it within known contexts speeds up the processing of such information. This cognitive processing proclivity of humans applies to religious belief systems and the use of religious concepts and doctrine in order to interpret information readily. Cognitive heuristics lend themselves to engagement in the confirmatory bias, whereby selective attention,

prominence, and value is placed on incoming information that adheres to the held cognitive schema, to the exclusion of consideration that the information might not be congruent. Like other schema, religious schema set the stage for an individual's response to others and to the world; it is the framework through which they interact. Religion can serve as a positive illusion through which believers can make sense of unstable and arbitrary phenomena. Finding religious meaning in uncontrollable situations and events can instill hope in people and allow them to cope with such problems. If religion and spirituality are to be understood from a psychological perspective in this way (i.e., as a worldview and pattern of thinking), then most likely connections exist between religion/spirituality and other facets of human life, such as health.

Koenig (2001b) has proposed a theoretical paradigm of how religion contributes to physical health. Much of it is couched within the context of the fight-or-flight response and the physiological sequelae of the response, particularly repeated and overextended responses. As reviewed previously, the stress response, if heightened or prolonged, has serious implications for cardiovascular health. Thus, anything that reduces stress and inhibits the fight-or-flight autonomic response would be related to decreases in problems of cardiovascular functioning. Beyond fixed factors such as gender, race, and age, four major areas are thought to play a role between religion/spirituality and health. Two of these reflect more direct paths to health while the remaining two are more indirect. Each of these can impact physiological factors (e.g., stress hormones, immune system, autonomic nervous system) as well as impact one another.

Direct Pathways

One of the direct ways in which religion can impact health is through adherence to health prevention and treatment. Many religious teachings promote the care of the body, placing importance on physical health. Religious communities can improve health monitoring by supporting and helping individuals with healthcare needs and help them to adhere to treatment. Furthermore, people who are religious may be more compliant with healthcare because they may be more compliant in general, with appeal to authority and responsibility to others often fundamental features of religions (Koenig, 2001b). Encouraging others in the spiritual community to attend regular healthcare appointments and to follow treatment regimens, for example, may be ways in which cardiovascular disease is both detected and managed effectively.

The other direct avenue through which religion may affect health involves the avoidance of unhealthful behaviors. Healthful prescriptions (e.g., promoting peace, rest, moderation) and proscriptions (e.g., against drunkenness, gluttony, bitterness) are found in many spiritual teachings (Martin & Carlson, 1988). The avoidance of excessive drinking, drug use, smoking, and extramarital sexual behavior often promoted in religions may directly influence health (Koenig, 2001b). Clearly, the prevention or cessation of the engagement in cardiovascular disease risk factors has merit in decreasing the chances of cardiovascular problems.

Indirect Pathways

Beyond the direct paths, religion and spirituality may offer indirect means through which health can be optimized. Social support has been implicated in many positive health outcomes, including cardiovascular health, primarily for its ability to attenuate

stress (Greenwood, Muir, Packham, & Madeley, 1996). Thus, one may hedge that religious social support, or fellowship, may provide similar effects, especially as the Greenwood et al. review found that the association for greater social support to decrease risk of coronary heart disease was strongest for emotional support. If religion reduces the likelihood of recurrent or chronic stress response activation (by providing social support, a more positive worldview through which to assess stressful events, and supporting positive health behaviors), then religion can facilitate the inhibition of cardiovascular diseases.

Of course, religion itself might in certain cases exacerbate stress by, for example, shunning individuals from the community or causing individuals to feel guilty. Religion is no stranger to interpersonal stress resulting from fundamentalism, ethnocentrism, and prejudice (Altemeyer, 2003). Religion, however, also has the ability to encourage positive social interactions that "provide a sense of belonging, give people a reason for living that transcends themselves, and in a variety of ways influence people to practice more preventative and therapeutically healthy behaviors" (Koenig, 1997, p. 81).

The other indirect way in which religion can influence health is through mental health. While acknowledging that there do occur instances of religious beliefs and practices harming mental health (e.g., infliction of guilt or condoning of aggression against others), religion in general does appear to aid mental health. In an extensive review of the literature regarding religion and mental health from the past century (Koenig, McCullough, & Larson, 2001a), contrary to widely held views in the field of psychology, religion was found to have a positive association with mental health. Although there were some discrepant results amongst the 630 studies reviewed, the vast

majority found that religiousness was correlated with mental health characteristics such as life satisfaction, happiness, positive affect, morale, hope, optimism, purpose, meaning, and social support. These studies also illustrated on the whole an inverse or lack of relationship between religion and depression, anxiety, psychosis, substance abuse, and behaviors such as extra-marital sexual activity, crime, and delinquency.

Why is Religion Beneficial?

Four main reasons were given by Koenig (2001a) to help explain the often beneficial connection between religion and markers of psychological (and physical) health. One reason is that religion allows for meaning to be derived by the individual believer to place order on experiences. Religion does so by proscribing to a generally positive worldview and those who are religious are better able to interpret positive and negative experiences as purposeful and meaningful, thus instilling optimism and hope. This meaning-making structure lends itself to more positive feelings and ideas than does a purposeless and chance-ridden view of the world. Positive emotions emerging from religious practice and experience are a second reason why religion may be linked with mental health. The positive feelings surrounding religion may prevent individuals from wanting to engage in pleasurable but health-hazardous behaviors. Furthermore, positive emotions stemming from religion may buffer daily hassles and stress. Through rituals and rites of passage, religion can add to positive psychological outcomes in a third way by providing community support during major life changes such as marriage and death. The religious community promotes in each individual characteristics such as altruism, generosity, and forgiveness towards others. Through these religious practices and beliefs, communities are strengthened and expanded, giving individuals access to greater social

support while also reinforcing familial bonds. Finally, religion creates a framework through which social mores can be understood and followed. In this way, the avoidance of certain behaviors (e.g., criminal behavior, substance abuse) that can lead to negative mental and physical health consequences is encouraged and reinforced within the religious community.

There is yet another avenue through which religion/spirituality appears to be connected to health. Many religious and spiritual traditions incorporate prayer or meditation and this practice too might serve to impact cardiovascular functioning. In his 1995 review, McCullough, writing from a Christian perspective, discussed prayer and the hypothesized mechanisms through which prayer affects health and psychological well-being. For example, he emphasized that prayer is not merely an activity one engages in only when a specific request for improved health is sought. Rather, such a gain is secondary to the true purpose of prayer: to commune with God. McCullough outlined some of the hypotheses for how prayer in particular can impact health, including the facilitation of the relaxation response. Prayer often is associated with decreased heart and respiration rates as well as decreased muscle tension. These physiological effects alone can boost mood and a person's sense of well-being. These correlates of prayer, in turn, can reinforce spiritual discipline and lead to positive expectations. Contemplative and meditative prayer are viewed as especially rewarding practices connected with physiological and psychological benefits, although these types of prayer may be accessible only by those who are mature in their faith.

Apart from these mechanisms, McCullough also suggests that spiritual pathways may be involved in health, conceptualizing God as actively participating in the prayer-

health connection. God may act by giving answers to individuals who have prayed specifically about their health status or the status of others, by supporting the individual during difficult times (e.g., comforting, encouraging), and by providing a will to persevere (e.g., through challenge or inspiration which may lead to greater strength or purposefulness). Prayer and meditation practices are being studied with increasing frequency and preliminary summaries of the literature point toward a positive association between these practices and improved health functioning, including cardiovascular functioning (Seeman, Dubin, & Seeman, 2003).

Thus, religion and spirituality work in a number of possible ways to influence physical health, at least theoretically. This theoretical relationship opens up many questions regarding the interrelatedness of spiritual/religious factors, psychological factors, and physical factors. For example, how might religion or spirituality figure in the relationship between hostility and cardiovascular disease? Forgiveness is a long-established practice in many religions (including Christianity and Zen Buddhism) which can be viewed as a reframing process (Hope, 1987). Might this factor, so antithetical to hostility, be important in the link between religion/spirituality and cardiovascular functioning? This is only one of many possible avenues of questioning. Clearly, the need is great for more research to be conducted in order to replicate reported findings and to understand better the influential relationship between religion/spirituality and cardiovascular health. The following section provides a closer look at more recent empirical findings in this area.

Empirical Findings for the Relationship between Religion/Spirituality and Cardiovascular Disease

Mortality/Morbidity Studies

One way in which religion/spirituality has been studied in relation to health has been through prospective, longitudinal studies that determined not only incidence of disease but also death from disease. Using national demographic data, a strong link between religion and lower mortality in American adults has been supported (Hummer, Rogers, Nam, & Ellison, 1999). Data from the Cancer Risk Factor Supplement-Epidemiology Study from the 1987 National Health Interview Survey (NHIS) was connected to follow-up data provided in the Multiple Cause of Death file of the 1997 NHIS and from these data collection vehicles, life expectancy and mortality variables were derived for 21,204 cases. Religious involvement was measured by the question, "How often do you go to church, temple, or other religious services?" with response categories of no attendance, less than weekly attendance, weekly attendance, and greater than weekly attendance. Other demographic and behavioral variables were included: age, sex, race, region of country, activity limitations, self-reported health status, bed-sick days, education, family income, cigarette smoker, alcohol use, marital status, social activity, reliable friends, and reliable family. There were seven cause-of-death categories, consisting of circulatory diseases, cancers, respiratory diseases, diabetes, infectious diseases, external causes, and miscellaneous causes.

The overall life expectancy was positively correlated with religious attendance. Individuals who never attended services had a life expectancy of 55.3 years whereas those who attended services more than once per week had an expectancy of 62.9 years (life expectancies of those in the categories of less than once per week and weekly

attendance fell between the extremes, at 59.7 and 61.9 years, respectively). The same pattern of results was found for risk of mortality, even when age, sex, race, socioeconomic status, and region of country were controlled for in statistical analysis. Likewise, when activity limitations, health status, and bed-sick days were taken into consideration statistically, the relationship between mortality and religious involvement was sustained, although slightly decreased its strength. Controlling for social connections and health behaviors, however, the religion-mortality correlation remained present, but clearly these partialled variables accounted for more variance in the relationship than had other variables. The reinforcement of social ties and healthy behaviors afforded by religious service attendance seems to partly explain how increased religious involvement impacts mortality risk (Hummer et al., 1999).

Still, when all hypothesized confounding variables were controlled for in analyses, the original pattern remained with individuals who never attended services at a 50% higher risk of mortality (and those in the two moderate attendance categories at a 20% greater risk) in comparison to those whose religious involvement was most frequent. With the exception of external causes, those who never attend services were at greatest risk of mortality for each of the other cause-of-death categories. The familiar religion-mortality pattern was less striking for death by circulatory diseases and cancer than it was for respiratory diseases, diabetes, and infectious diseases. Differences in the involvement of mediating variables were also found between mortality categories: health behaviors appeared to play a role between religion and mortality for respiratory diseases and, to a lesser extent, for circulatory diseases (Hummer et al., 1999).

The Hummer et al. demographic study offered an enhanced picture of the role of religion in health outcome. While religion itself was not measured multidimensionally, the use of statistical controls for hypothesized mediating and confounding variables lends support to the idea that religion works via more secular means such as social outlets and health behaviors, but that religion retains something beyond these that still appears to impact health and mortality.

In the interest of improving on Hummer et al.'s study, specific mortality data on 6545 individuals were analyzed along a number of demographic, social, and medical lines (Oman, Kurata, Strawbridge, & Cohen, 2002). These data were collected during the years 1965 through 1996 in Alameda County in California. The participants were visited at home and completed written questionnaires regarding sociodemographic variables (ethnicity, education, income, birthplace, and religious affiliation), health status (comorbid diagnoses, shortness of breath, days in bed, mobility, depression, and self-rated health), health behaviors and anthropometrics (exercise, smoking, alcohol consumption, and weight), and social connections (marital status, number of close friends, number of close relatives, and number of group memberships). Religion was also measured using a five-point scale of frequency of religious attendance, although the variable was later collapsed into a dichotomous infrequent/frequent response for the statistical analyses. Participants who died during the years of the study were matched to the California Vital Statistics Mortality Files, the Social Death Index, and the National Death Index in order to determine the cause of death. Mortality categories were circulatory diseases, cancer, digestive diseases, respiratory diseases, external causes, and

a residual category. Mortality by circulatory diseases was further categorized by ischemic heart disease, cerebrovascular diseases, and other circulatory diseases.

Some initial differences were found amongst participants based on religious attendance, with men and Asians attending religious services less frequently than women and other ethnic groups, respectively; individuals in the highest income tier were also less likely to attend services frequently (Oman et al, 2002). Contrarily, older individuals as well as African Americans and Hispanics were significantly more likely to be frequent attenders. In terms of health status, individuals who were frequent religious services attenders had a reduced likelihood of shortness of breath, exceeding one month of being sick in bed, depression, and rating themselves as having fair health. These same individuals as a group were more likely to engage in exercise but less likely to smoke or excessively consume alcohol. Socially, frequent attenders had more social connections, characterized by close relatives and friends as well as nonreligious group membership.

Oman et al. also found some intriguing results from multivariate analyses. After such factors as age, gender, sociodemographic, and health status were statistically controlled, the single dichotomous measure of frequency of religious attendance significantly predicted death from circulatory, digestive, and respiratory diseases. That is, the more frequently one attended religious services, the less likely one was to die of circulatory, digestive, and respiratory diseases, independent from the effects of other variables in the study. Moreover, more frequent religious attendance was specifically and significantly associated with decreased risk of mortality from cerebrovascular disease. Thus, this particular study indicated that, using variables measured such as they were (i.e., self-report of health-related variables, dichotomous measure of religion),

religion provided an independent protective effect for health, especially so for death by circulatory, digestive, and respiratory diseases.

In another longitudinal study, King, Mainous, Steyer, and Pearson (2001) utilized data from the National Health and Nutrition Examination Survey III 1988-1994 to identify a relationship between religion and inflammatory markers of cardiovascular disease risk. Of the 10,059 qualifying survey respondents who were over the age of 40, approximately 63% reported having attended at least one religious service in the past year while about 37% indicated that they had not attended any services in the past year. This religious attendance variable, along with other demographic and health variables, was analyzed for relationships to three inflammatory markers: white blood cell count, C-reactive protein, and fibrinogen. Those with lower frequency attendance at religious services were found to have significantly higher white blood cell counts as well as higher C-reactive protein, implying that they were at greater cardiovascular risk. When covariates such as age, gender, health status, and body mass index were controlled for, the relationship between religious attendance and less cardiovascular risk held. When smoking was statistically considered, however, the relationship was no longer significant. Thus, the frequency of religious attendance in this large sample was found to be associated with lower levels of two of the three selected inflammatory markers, but this appeared to be mediated by smoking status.

Intergenerational aspects of religion and cardiovascular disease have also been considered. Neumann and Chi (1998a) measured the similarity between participant and maternal religious beliefs as well as looked at maternal church attendance, both in relation to cardiovascular risk markers (e.g., plasma protein, immunological cell

variables, systolic blood pressure). Cardiovascular variables were collected from 31 Caucasian adult participants who had been arranged into four maternal-based groups—high religious similarity, low religious similarity, high attendance frequency, or low attendance frequency. This categorization was based on participants' responses to two questions regarding maternal religious practice. In addition to the cardiovascular variables, which were acquired before and after a brief psychological stress test, other measures were completed by the participants, including anxiety, depression, anger, coping, health behaviors, and religious information. The strongest significant differences were detected in this sample for T-suppressor cell percentage and T-helper/T-suppressor cell ratio. Both lower-frequency and lower-similarity participants had lower T-suppressor percentages in comparison to their higher counterparts; the inverse relationship was found for the T-helper/T-suppressor ratio. Thus, greater dissimilarity in maternal religious values and those whose mothers attended church more infrequently appeared to be more prone to cardiovascular disease. Interestingly, participants who shared maternal religious beliefs had significantly higher anger temperament scores on the State-Trait Anger Expression Inventory than those in the dissimilar group.

Another study retained the same essential design but looked at paternal religious value similarity and paternal church attendance (Neumann & Chi, 1998b). Fifty participants were organized into the four groups based on paternal religious practice. For the religious value similarity variable, the high-similarity group was found to have lower high density lipoprotein levels than did the low-similarity group. For the group whose fathers attended church frequently, plasma protein levels and NK cell percentages were elevated in comparison with the low-frequency attendance group. The high-frequency

group also had a higher rate of NK cell percentage increase after the stress test. Contrarily, this group also evidenced a significantly greater decrease in post-stress test T-cell percentage. On the psychological measures, the high-frequency group endorsed significantly greater task coping and forgiveness and had lower scores on measures of emotional coping, state and trait anxiety, hostility, and anger.

The studies by Neumann and Chi, however, require a cautious approach to the evidence. By their own admission, the investigators conducted preliminary empirical work in this area, and the results require replication. Some other methodological concerns are that the parental-related variables were determined only in retrospect, with the participants identifying parental religious values and attendance for when they (the participants) were in grades 6-8. Thus, this set of studies shows promising avenues for future research, but the results are arguably weak.

Another study teased out some of the complications between variables in the relationship between blood pressure, health behaviors, and religiosity (Hixson, Gruchow, & Morgan, 1998). Using a multidimensional measure of religiosity that yielded subscale scores for intrinsic religiosity, extrinsic religiosity, belief factor, religious well-being, organized religious activity, nonorganized religious activity, religious knowledge, religious experiences, and religious coping, the investigators measured blood pressure and collected data on age, BMI, diet, exercise, smoking, and alcohol intake in a group of 112 Judeo-Christian adult women. The main thrust of the results from this study was that religion as measured did not appear to exert an effect on blood pressure primarily through health behaviors, but rather seemed to have a more direct effect, possibly through helping to manage stress, which is related to elevated levels of blood pressure. In particular,

higher diastolic blood pressure was more associated, in a reverse direction, with intrinsic religiosity, religious coping, religious experiences, extrinsic religiosity, religious well-being, and belief factor subscales, as well as with the total religiosity score.

Koenig and colleagues looked at differences in blood pressure among older adults living in community settings who engaged in religious activities (Koenig, George, Hays, Larson, Cohen, & Blazer, 1998). Religious activity as a variable included frequency of religious service attendance, frequency of prayer/meditation/Bible study, and frequency of accessing religious media (i.e., religious television or radio programs). The study included three waves of assessment interviews with the first in 1986, followed by re-assessment in 1989-1990, and a third follow-up assessment was conducted in 1992-1993. This study found that those who more frequently attended religious services had lower blood pressure than those who attended infrequently, a finding similar to that for individuals who engaged in private religious activity (e.g., prayer, meditation, or Bible study) more frequently versus those who were infrequent in these activities. Interestingly, more frequently accessing religious media was associated with higher blood pressure. There was some support for religious attendance at Wave 2 to independently predict lower blood pressure at follow-up a few years later.

In racial comparisons, the favorable relationship between frequent religious attendance and lower blood pressure was stronger among African Americans than among Caucasians; this was also true during Wave 2, with the findings extending to an independent prediction of lower Wave 3 blood pressure by Wave 2 religious attendance. Private religious activity also predicted decreased blood pressure at both follow-up occasions. Similar to the racial findings, age also differentiated between blood pressure

assessments. Greater religious attendance was significantly correlated with lower blood pressure in the younger elderly but not in the older elderly. Likewise, greater private religious activity appeared to be linked with lower blood pressure in the younger age group, while accessing religious media was significantly linked with higher blood pressure in the younger group. The researchers also found that individuals who frequently engaged in both religious services and private religious activities were less likely to have higher blood pressure levels. Finally, those who more frequently attended religious services reported higher adherence in taking hypertensive medication, and further statistical analysis found that the differences in blood pressure found in the religious variable comparisons remained when hypertensive medication use was controlled statistically (Koenig et al., 1998).

In a prospective study of stoke incidence, 2812 elderly individuals were assessed from baseline assessment in 1982 until 1988 (Colantonio, Kasl, & Ostfeld, 1992). Among other psychological variables, religion was measured by three items: frequency of religious service attendance, subjective degree of religiousness, and subjective degree to which strength and comfort is derived from religion. Initial analyses indicated that higher depression scores were significantly associated with greater incidence of stroke while more frequent religious service attendance was predictive of lower risk of stroke. However, when other related variables (e.g., age, hypertension, diabetes, physical functioning) were analyzed multivariately, the significant relationships, including religious attendance, vanished. Although the religious attendance item was correlated with the two other religious items, these other items were never significantly associated

with outcome. The researchers assumed that what religious service attendance contributed to incidence of stroke was accounted for by physical functioning.

A number of physiological, psychological, and social data were measured in a study involving 232 elderly cardiac patients who were receiving coronary artery bypass grafting surgery and/or aortic valve replacement surgery (Oxman, Freeman, & Manheimer, 1995). The major outcome measure was death by 6 months post-surgery. In addition to the myriad independent variables, religion was also considered. Five questions regarding religion taken from an interview used at the New Haven site of the Established Populations for the Epidemiologic Study of the Elderly (EPESE) program, the following information was collected from participants: religious denomination, religious functions attendance, available religious social contact, strength and comfort from religion, and sense of religiousness. While both strength and comfort and sense of religiousness were negatively correlated with risk of death by 6 months, only strength or comfort from religion was found to be a significant independent predictor of mortality (along with previous cardiac surgery, greater age, severe impairment in basic activities of daily living, and participation in groups).

Not all studies on morbidity and mortality focused exclusively on religion. One longitudinal study focusing on spiritual beliefs and physical health outcome concluded that spiritual beliefs were associated with poorer outcome at follow-up (King, Speck, & Thomas, 1999). One half of the 250-person sample was cardiac patients, while the other half consisted of gynecological patients. Approximately 80% of those with cardiac problems declared themselves to have spiritual beliefs at baseline; for the sample as a whole, those with more compromised health status were found to have lower scores on

the strength of spiritual beliefs scale (The Royal Free Interview for Religious and Spiritual Beliefs). At nine-month follow-up, the mean strength of spiritual belief had decreased, although when analyzed separately from the gynecological subset (in which this decrease was statistically significant), the cardiac subset did not experience a significant decrease. When health outcome, as measured by independent clinical case notes, was dichotomized into "improved" and "unchanged, worse, or died", those patients who professed stronger spiritual beliefs at baseline were significantly more likely to have poorer health outcome at follow-up (males were also independently predicted to have worse health outcome). These findings are interesting, particularly as they involve strength of spiritual belief rather than religious affiliation or attendance measures. Methodologically, however, the way in which spiritual belief was measured leaves much to be desired: there was no attempt to understand the content or nature of the spiritual beliefs, only that they were more or less held. For this reason, the help or hindrance of spiritual beliefs in health outcome does not appear furthered by this study.

Religious and Ethnic Group Studies

One prospective study focused exclusively on a particular ethnic population. Initially evaluated in the 1960s with follow-up continued through 1986, the participants in the Israeli Ischemic Heart Disease Study provided much-valued longitudinal data on religion and cardiovascular disease (Goldbourt, Yaari, & Medalie, 1993). Information from 10,059 Israeli men was obtained, including religious orthodoxy, and these men were followed for approximately 23 years to gain additional mortality information. The measure of religious orthodoxy entailed three items regarding religious education, self-described orthodox, and frequency of attending synagogue. Scores from these items were

then compiled to issue a rank of overall religious orthodoxy on a five-point scale. Those individuals ranked as highly orthodox had significantly fewer coronary heart disease deaths than the other individuals in the study. This was likewise true for the rates of all-cause mortality. The finding remained even when differences were sought based on area of birth and concentration camp survivorship. For those given the least orthodox ranking, coronary heart disease mortality was significantly higher. While the advantage of the religiously orthodox participants in terms of cardiovascular mortality was small, given the various other risk factors involved with health, the study is important because the correlation between orthodoxy and better cardiovascular health was an independent one, continuing to exist even when distribution of blood pressure, prior coronary heart disease, cigarette smoking, serum cholesterol, and prevalence of diabetes were accounted for statistically.

An older study compared orthodox and secular Jews residing in Jerusalem in terms of risk for myocardial infarction (Friedlander, Kark, & Stein, 1986). In a sample consisting of individuals under the age of 65 who had experienced one myocardial infarction, degree of orthodoxy was determined by self-report, as was data regarding sociodemography, medications, cigarette smoking, alcohol consumption, and medical history, including family history of cardiovascular disease. Results indicated that risk for myocardial infarction increased with age and with cigarette smoking, but decreased for those with more education. Also, men who were born in Europe were at significantly greater risk for myocardial infarction than those born in other regions. Most interestingly, those who described themselves as secular Jews had a significantly higher likelihood than those described as orthodox to experience myocardial infarction, a finding

that stood independently when other covariates were accounted for in analysis. This study, however, suffers from some potential problems, most noticeably the lack of matched controls. In terms of pure percentages, the non-myocardial infarction control group was significantly different from the cardiac group in variables such as place of birth, education, smoking, and religious orthodoxy. Thus, the "control" group was distinguished from the myocardial infarction case group in many more ways than just experience of the cardiac event.

In a study comparing the rates of death by heart disease in 24 Western countries, rates appeared to fluctuate depending on the prominence of religious category in the country (Watson, 1991). Comparing percentages of Roman Catholics in each country, according to, in part, the 1990 edition of *Europa World Year Book* and the ischemic heart disease death rates from the 1987 *World Health Statistics Annual* of the World Health Organization, countries with more Roman Catholics tended to have lower rates of ischemic heart disease whereas countries with fewer Roman Catholics were associated with higher levels of mortality caused by ischemic heart disease. Watson placed this finding within the cultural realm and related it to the "Protestant work ethic" that arguably is associated with Type A behavior patterns.

A recent prospective study of older adults in Japan found a relationship between particular religious beliefs and hypertension (Krause, Liang, Shaw, Sugisawa, Kim, & Sugihara, 2002). This endeavor is notable in that it is one of the few studies to measure religious beliefs and health outcome in an Asian sample whose Shinto and Buddhist religious beliefs are considerably different from the Judeo-Christian beliefs more commonly investigated. Comparing the self-report data of 1723 participants provided by

the National Survey of the Japanese Elderly in the years 1996 and 1999, the investigators looked at incidence of hypertension, death of a loved one, private religious practices, religious coping, and belief in an afterlife, along with a number of covariates (e.g., smoking, exercise). Attrition between the two time points revealed significant differences between the noncompleters and completers, with the former group being older and more highly educated, less likely to exercise or to privately practice religion, and tended to have a lower body mass index. While private religious practice and religious coping in the final sample were not significantly related to hypertension outcome, a belief in an afterlife was related to less risk of hypertension after the death of a loved one. Because death of a loved one and belief in an afterlife were not significantly correlated, such belief does not emerge after such a stressful event and thus does not appear to be stress-responsive. Despite the self-report methodology employed here regarding health status, this study offers some clues as to how religion can impact cardiovascular health in the elderly in Japan and offers some support for a cognitive framework that may aid in coping with the loss of a loved one that can have beneficial ties to health.

Focusing on Muslims, Akhan, Kutluhan, and Koyuncuoglu (2000) looked at the relationship between incidence of stroke and time of religious year. Specifically, the month of Ramadan (the ninth month in the 345-day lunar-based Islamic year) was compared to other months in the year to determine if there were differences in stroke incidence. Religious practice during Ramadan is typified by abstinence. A rigorous fasting from food, water, smoking, and sexual relations is observed. The intake of food and drink is prohibited during daylight hours. Meals in the early morning (Sahur) and

late evening (Iftar); due to the limitations of fasting, more caloric, fatty, and sweet foods are consumed during Ramadan. This retrospective study concentrated on hospital incidence records from southwest Turkey during the years 1991-1995, when Ramadan occurred during the area's dual-climate winter. Stroke incidence was measured by computed tomography confirming either cerebral infarct or hemorrhage and mean incidence counts were obtained for each month of the study. In total, there were 1579 individuals who suffered stroke during the study timeframe, with a roughly equal number of men and women. No significant differences in incidence were found between those experiencing stroke during the month of Ramadan when compared to incidence in other months. The investigators concluded that the abstinence practices of Ramadan have neither health-enhancing nor deleterious effects on this sample's risk for stroke. While other research has been inconclusive for other cardiac conditions, Ramadan health effects may vary between different cultures and climates.

In yet another part of the world, a total of 3148 individuals living in Rajasthan, India were measured for cardiovascular risk factors and social factors that may be related to cardiovascular health (Gupta, Prakash, Gupta, & Gupta, 1997). In this particular study, coronary heart disease was diagnosed if individuals had a history of angina, infarction, or documented coronary heart disease, as well as if there were electrocardiographic (ECG) changes. While substantial proportions of the sample were identified with cardiovascular risk factors, regression analysis showed that, for males, CHD-related ECG criteria were predicted by greater age and smoking and that for females these criteria were predicted by greater systolic blood pressure as well as age. Interestingly, for men who achieved higher levels of education, CHD was less prevalent.

This was also the case for those men who reported engaging in regular prayer habits, including yoga practice.

Arguments for the notion that the association between religion and cardiovascular health can be explained by other variables such as social support and shared ethnicity were tested by Walsh (1998) in a sample of immigrants residing in the United States. Blood pressure, religious commitment, general cardiovascular health, demographic items, assimilation, and anomie (i.e., the stress encountered by immigrants in trying to concurrently hold two systems of societal norms) were measured in 137 immigrants from 17 different countries. Religious commitment was an index that collapsed the responses from two dichotomous measures of religious services attendance and importance of religion. The findings showed that those who were not committed religiously were at greater risk for hypertension on both systolic and diastolic blood pressure. This continued to be evident even when relevant covariates such as assimilation, anomie, SES, and gender were considered. While an independent predictor of hypertension risk, religious commitment was significantly correlated with greater assimilation and less anomie, thus implicating religion in the positive assimilation process of immigrants.

African Americans

African Americans, who are at greater risk for developing hypertension than any other racial group, understandably have been the focus of some research regarding religion/spirituality and cardiovascular health. As noted previously, one study found African Americans to be distinctive in the strength of relationship between frequent religious attendance, private religious activity and lowered blood pressure in comparison to other racial categories (Koenig et al., 1998). This distinctiveness may be related to the

importance of religion and spirituality in the lives of African Americans, as well as the role religious institutions historically have played in the African American community. For example, some evidence suggests that significant gains have been made in improving health and decreasing cardiovascular risk factors in African American women when efforts can be contextualized within and supported by religious and spiritual communities (Yanek, Becker, Moy, Gittelsohn, & Koffman, 2001). Such gains have lasted at one-year follow-up; additionally, programs were found to be voluntarily maintained within the religious community long after the research program officially ended.

In a sample of 1420 African Americans, of whom approximately 41% were men and 59% women, blood pressure and markers of social integration were posited as having an inverse relationship in this sample (Livingston, Levine, & Moore, 1991). Social integration, a structural index of social support, was measured by employment status, marital status, extent of group affiliation, extent of church affiliation, and the extent to which one feels that he or she could rely on another to talk to during a time of need. Church affiliation was measured simply with a "yes/no" endorsement. So that social integration could be examined for its independent relationship with blood pressure, age, education, household income, antihypertensive medication, alcohol consumption, cigarette smoking, cardiovascular activity, sodium intake, height, and weight were measured for their use as covariates. Due to the existence of known gender differences in blood pressure, statistical analyses were carried out separately for men and women. In terms of social integration, church affiliation was the only variable of the five social support variables to be significantly correlated with lower blood pressure, both diastolic

and systolic, in both men and women. Even when significant covariates were controlled in analyses, church affiliation was significantly inversely related to blood pressure.

Qualitative investigations among African Americans have provided more evidence for the role of religion in coping with hypertension (Brown, 2000). Brown found in her interviewing study of 20 African Americans that religion was very important in these individuals' management of hypertension, specifically in how religious beliefs helped them to feel protected from problems arising from hypertension, provided them with a sense of control over their condition and its management, and increased their coping ability. This study contained qualitative indications of religion's role in improved management of hypertension in this sample.

In another study, spirituality was proposed as a moderator between experiences of racism and cardiovascular response (Bowen-Reid & Harrell, 2002). Using self-report measures of racist experiences, health symptoms, and spirituality, 155 African American undergraduate students engaged in an isometric handgrip stress task and a mirror trace psychological stress task. Blood pressure measures were taken during the tasks as well as during resting periods. Interestingly, higher cardiovascular response to the psychological stressor was associated with less experience of racism. Participants were divided into two groups via a median-split of their spirituality scores. Findings indicated that while most individuals in both groups found their racist experiences to be stressful, only those in the low-spirituality group who had stressful racist experiences also were found to have poorer health outcomes (i.e., higher scores on health symptoms measure). The investigators discussed the importance of considering spirituality as one way of coping with racism, thus decreasing stress implicated in negative health outcomes.

Finally, in a controlled trial of treatments to reduce hypertension in older African Americans, transcendental meditation was found to be especially effective (Schnider, Staggers, Alexander, Sheppard, Rainforth, Kondwani, Smith, & King, 1995). In a sample of 127 participants, transcendental meditation and progressive muscle relaxation were found to be significantly better than a lifestyle modification education control condition at reducing both diastolic and systolic blood pressure. Moreover, those receiving instruction in transcendental meditation experienced significantly greater decreases in blood pressure readings than those in the progressive muscle relaxation group. Unlike other studies in this area, Schneider et al. designed a more methodologically sound study, in part by measuring and controlling for confounding variables (e.g., exercise, diet). The study outcome is greatly important in light of the unfavorable disparities experienced by African Americans in cardiovascular diseases.

The same is true of another study that indicated a divergent relationship between blood pressure and religious coping when younger adult (ages 25-44 years) African Americans were compared to younger adult Americans of European descent (Steffen, Hinderliter, Blumenthal, & Sherwood, 2001). Blood pressure was measured at intervals over a 24-hour period, encompassing sleeping and awake blood pressure readings. In African Americans, who comprised approximately 50% of the 155-strong sample, both sleep and wake blood pressure was significantly reduced in those who endorsed greater religious coping, as measured by the COPE religious coping scale. This relationship was not found for the other participants. Perceived social support was also found to covary with religious coping in African Americans, but when perceived social support satisfaction was partialled out during analysis, religious coping remained a strong

predictor of decreased blood pressure (in actuality, social support was only significantly related to awake blood pressure readings).

Prayer and Meditation

In a study looking at the utilization of complementary and alternative therapies in cardiac patients over the age of 35, spiritual healing was one of many complementary practices sought by participants (Ai & Bolling, 2002). Of 225 patients assessed prior to cardiac surgery, almost 81% had used some type of complementary technique. Slightly less than a quarter of the participants reported having tried spiritual healing. Attempts to use complementary and alternative therapies were found to be higher in those who had more years of education, a better functioning status, fewer noncardiac chronic conditions, and were more likely to have been former smokers and have had the specific cardiac condition of congestive heart failure.

For those with life-threatening illnesses, death distress is a common and disturbing feature. Healthcare workers in palliative care have been interested in the determinants of death distress, characterized by death anxiety and death depression, and what role spirituality may play in this. In a group of 45 patients with diseases (including those with cancer, cardiac, pulmonary, and liver/kidney diagnoses), spiritual well-being, as measured by The Modified City of Hope Questionnaire (MCHQ), was a significant predictor of death distress, along with physician communication and physical symptom severity (Chibnall, Videen, Duckro, & Miller, 2002). Thus, greater death distress was experienced by those with greater physical symptom severity, poorer communication with physician, and poorer spiritual well-being. Higher scores on depression were also moderately predictive of death distress in this group. The investigators argued that

greater attention to these psychosocial-spiritual factors is of great importance in understanding and helping those with life-threatening medical conditions. This is also true of those living with disability brought on by a cardiovascular event or condition is another area where religion and spirituality can very much be active. Focusing on the spiritual in those who have suffered a stroke, Kyllo (1996) noted that the spiritual realm may be the only area of a person's life in which he or she can maintain independence. Unfortunately, the spiritual component in most stroke patient's lives is often neglected by others in the immediacy to help the physical component of the person. Stroke can leave individuals feeling guilty, angry, useless, and hopeless, but spirituality can provide comfort to these individuals, providing what Kyllo regarded as four basic needs: love, purpose and value, power and control, and belongingness.

Embedded in a larger study, the use of prayer and meditation was predicted by a number of factors in a sample of 879 Canadian older adults (Wister, Chittenden, McCoy, Wilson, Allen, & Wong, 2002). Using data from the 1995-1996 North Shore Self-Care Study, the use of alternative medicine and techniques to aid in the coping of three chronic illnesses—arthritis, heart disease, and hypertension—were investigated. Predictor variables were predisposing factors (e.g., gender, age, health beliefs), need factors (e.g., pain, activity limitations, illness duration), and enabling factors (e.g., income, social support, self-efficacy). Approximately 29% of the sample reported using prayer or meditation as a way to cope with their chronic illness. No significant differences were found between participants with arthritis and participants with either of the cardiovascular conditions in terms of their proclivity to engage in prayer or meditation. Results of logistic regression analysis identified younger age, female gender, non-married

status as predisposing characteristics associated with practicing prayer and meditation to cope with health conditions. Perception of greater severity of illness and longer illness duration were need factors that increased the likelihood of coping with prayer or meditation. Also, prayer or meditation was more likely to be practiced by individuals who had both a number of confidants in their social network as well as support from another person who has the same illness.

In a retrospective study, Ai, Bolling, and Peterson (2000) examined the role of private prayer in 151 individuals who had received coronary artery bypass graft (CABG) surgery. All participants had responded to measures at 6- and12-month follow-up. The majority (97%) of patients were Caucasian and 74% of the sample were men. Measures of socioeconomic status, emotional health, religious involvement, social support, and health conditions. Specific to religious involvement, the participants at 1-year post-CABG surgery were asked to respond to items assessing the importance of religion, church service attendance, church activity participation, faith in God, and prayer for guidance or strength. Another category, religious involvement, was a dichotomous variable derived from the responses to the other religious items. Approximately 76% of the sample indicated that religion was important to them and a majority endorsed religious coping during the aftermath of surgery. Seventy-three percent (73%) replied that they had faith in God, 68% practiced private prayer, 54% regularly attended church services, and 52% participated in church activities. Structural equation modeling depicted those practicing prayer as having less psychological distress at 12-month follow-up, even when estimated distress at 1-month and distress at 12-month were controlled in analysis. This was true when noncardiac health conditions were also controlled. Further

analyses showed that prayer was significantly related to the other religious variables. Logistic regressions indicated that prayer was correlated with greater importance of religion, higher 1-month post-CABG depression, higher pre-CABG self-rating of health, lower income (less than $35,000), and a pre-operative age under 65 years. Associations were different for those under 65 years of age versus those 65 years or older. The older group had a stronger connection between prayer and importance of religion, and this variable plus less education were found to predict prayer use in the older group. The practice of prayer was predicted in the younger group by an income of less than $35,000, higher self-ratings of pre-CABG health, importance of religion, and some college education. While retrospective with somewhat crude measurements of religious variables, this study suggests that prayer appears to be beneficial for the psychological adjustment to life after CABG surgery.

For example, one study looked at private prayer as a means of coping with post-operative depression following CABG surgery in middle-aged and elderly patients who had undergone the procedure (Ai, Dunkle, Peterson, & Bolling, 1998). While no formal measure of private prayer and religiosity was used in this study, the use of private prayer was significantly associated with other variables more rigorously measured. Those who endorsed engaging in private prayer post-CABG surgery were more likely to be younger (under 65), of a lower income bracket (under $35,000), and to have indicated better pre-CABG surgery health. Individuals who privately prayed were also more likely to be more religious and to some extent had greater depression during the first month after surgery. When the effects of variables such as noncardiac health conditions, first-month post-surgery depression, and social support were taken into statistical consideration,

private prayer emerged as having a significant independent main effect on decreased current general psychological distress.

Prayer's relationship with optimism was considered in a study using a similar sample (Ai, Peterson, Bolling, & Koenig, 2002). Optimism, importance of private prayer, intent to use prayer to cope with surgery, faith in the efficacy of prayer, prayer content, religious affiliation, and religiousness were measured along with mental and physical health status in a sample of 246 patients soon to undergo cardiac surgical procedures. Older participants, higher socioeconomic status, and those who were less depressed and anxious were more likely to be optimistic. Private prayer, excluding prayer content, also significantly predicted optimism, although religious affiliation and religiousness did not. Notable from this study is that traditional measures of religion (i.e., affiliation and religiousness), at least as measured in this study, were not associated with the positive and health-beneficial characteristic of optimism, whereas the debatably more sensitive measure of private prayer was.

Religious/spiritual practices also have been shown to have a direct effect on cardiovascular functioning. Recitation of both rosary prayer and yoga mantras were found to decrease respiration, systolic blood pressure, diastolic blood pressure, and transcranial blood flow (Bernardi et al., 2001). Both the Ave Maria rosary prayer, in its traditional Latin, and the mantra "om-mani-padme-om" were found to be similar to one another in inducing a respiratory rate of six breaths per minute. Slow respiration such as this has been linked with decreased cardiovascular problems, and increased relaxation and well-being. Interestingly, this cycle is roughly equivalent to the rate of Mayer waves, a 10-second blood pressure cycle connected with vagal and sympathetic activity. The

congruency of Mayer blood pressure waves and respiratory rate enhanced the beneficial effects reported above. The physiological effects of recitation were found in 23 healthy adults in Italy who also were found to have had more regular breathing during rosary and mantra recitation than during spontaneous breathing and free-talking. This synchrony between recitation and cardiovascular rhythms (i.e., Mayer waves) augmented the congruency of sympathetic and vagal outflow. Baroflex sensitivity, implicated in cardiovascular difficulties, was also significantly decreased during rosary and mantra recitation.

A fair number of studies have found associations between decreases in cardiovascular markers of disease and the practice of prayer and meditation. A group of nuns (assumed to live contemplative and prayerful lives) were followed longitudinally for 30 years and were found to have fairly stable blood pressure over time whereas increases in blood pressure were found for a control group (Timio, 1997). Mindfulness meditation has also been found in a controlled study to decrease anxiety in women diagnosed with heart disease (Tacon, McComb, Caldera, & Randolph, 2003). The practice of yoga, including meditation and relaxation components, has been associated with decreases in respiration rate (Arambula, Peper, Kawakami, & Gibney, 2001), pulse rate (Telles & Vani, 2002), and oxygen consumption, as well as with an increase in breath volume (Vempati & Telles, 2002). Zen Buddhist meditation practices have been found to increase heart rate variability (Kubota, Sato, Toichi, Murai, Okada, Hayashi, & Sengoku, 2001) and to decrease serum cortisol, vital capacity, diastolic blood pressure, systolic blood pressure, and pulse rate (Sudsuang, Chentanez, & Veluvan, 1991). In one study,

Zen Buddhism's practice of tanden breathing lowered respiration rate and increased heart rate variability (Lehrer, Sasaki, & Saito, 1999).

One of the most popularly studied meditation techniques has been Transcendental Meditation, a practice of "restful alertness" experienced in a seated posture with eyes closed (Barnes, Treiber, & Davis, 2001). A recent review of Transcendental Meditation and its impact on cardiovascular functioning cited evidence for its beneficial effect on blood pressure, lipids, and cholesterol (Walton, Schneider, Nidich, Salerno, Nordstrom, & Merz, 2002). Recent studies in Transcendental Meditation showed an association not only with decreased blood pressure (Barnes, Treiber, & Davis, 2001), but also with increased heart rate variability. Perhaps most interesting was the finding that, in a controlled study, Transcendental Meditation significantly decreased exercise-induced myocardial ischemia in patients with coronary artery disease (Zamarra, Schneider, Besseghini, Robinson, & Salerno, 1996). Of interest is that a number of the studies on Transcendental Meditation were conducted with participants who had no apparent background in meditation; thus, the beneficial effects were evident despite lack of experience in meditation.

One of the most controversial studies in the area of cardiovascular health and religion is that of Byrd's 1988 intercessory prayer study. After admittance to a coronary care unit, 393 patients were randomly assigned to either an intercessory prayer group or to a control group. Patients who consented to participate were aware of the purpose of the study as well as the possibility that they might not be prayed for. Byrd, medical staff, and the patients themselves remained blind to who was in each group. Intercessors were active Christians (i.e., they practiced daily prayer and were involved in their local

church). Each patient in the intercessory prayer group was assigned to three to seven individuals who would engage in daily intercessory prayer for the patient until the patient was discharged from hospital. Intercessors were given some direction as to the content of prayer. The entire study occupied 10 months and follow-up medical diagnostic outcome data were collected after entry into the study. The results showed that the patients in the intercessory prayer group had significantly lower hospital course severity scores than those in the control group. Furthermore, the intercessory prayer group was significantly less in need of diuretics, antibiotics, and ventilator assistance during their hospital stay. One of the criticisms of this design is that the participants who agreed to be in the study were individuals who were receptive to the idea of prayer and of others praying for them. Likewise, no data were collected on the participants' own religious and spiritual beliefs and practices, including private prayer. Furthermore, there was no way to control for intercessory prayer conducted by others outside of the study, thus the control group was only a control group for study-organized supplemental intercessory prayer.

A more recent study attempted to replicate the findings of the Byrd study using slightly different methodology (Aviles, Whelan, Hernke, Williams, Kenny, O'Fallon, & Kopecky, 2001). Again, patients admitted to a coronary care unit were randomly assigned to either an intercessory prayer group or a control group. The 799 patients were randomized upon discharge from the care unit and the 383 participants in the prayer group were prayed for at least once a week for the next 26 weeks post-discharge by five intercessors. The intercessors were recruited from local religious and community groups and on average each individual prayed for approximately 7 patients. Aviles et al. did not find any significant differences between the two intervention groups and indeed many of

the confounds of the Byrd (1988) study remained. There was no way of accounting for spiritual and religious practices of the individual patients nor was there any way to determine if others outside of the study were offering intercessory prayer (i.e., the control group was not a pure control group but a supplemental prayer group). Furthermore, there was no standard for prayer content, frequency of prayer, prayer duration, or way to measure sincerity of prayer. While these studies are on intercessory prayer are interesting, there does not appear to be an ethical way to isolate and designate prayer, particularly intercessory prayer, in order to study it empirically with stricter control.

Problems and Criticisms of Empirical Literature

Although the reviewed studies on mortality, morbidity, ethnic and religious groups, and prayer and meditation indicate that religion and spirituality on the whole are significantly linked to cardiovascular health, methodological problems plague this area of inquiry. Empirical research on religion/spirituality and physical health may be on the rise, but problems in measurement and study design have prevented the evidence from being conclusive (Hill & Butter, 1995). Religion has most often been measured as a single factor, such as a dichotomous endorsement item or frequency of attendance at religious services. Religion conceptually involves many factors and necessitates measurement using a multidimensional approach. This is especially true if spirituality is to be considered in addition to religion. Physical health itself requires better definition as well, especially as it relates to well-being. These two concepts are not equivalent terms and physical health is better described as a part of the much broader idea of well-being. Thus, it becomes necessary to appreciate the difference between health and well-being in order for religion to be understood more clearly in reference to either one.

There also is a concern about epistemological orientation in studying religion/spirituality and health. Most scientific researchers do not consider that some variance in health research could be accounted for by supernatural means while some religious individuals may not welcome the unveiling of any scientific connections between religion and health. A middle ground can be reached, though, if the more scientific-minded are flexible towards understanding the phenomenon of religion and if the more religious are open to viewing other aspects of life that can enhance health (Hill & Butter, 1995).

A fairly recent review of the literature linking spirituality and religion to improved cardiovascular health outcome concluded that there was much positive evidence for the association and indeed encouraged the healthcare system to invest more attention to matter (Luskin, 2000). Reviews such as this one and Koenig, McCullough, and Larson (2001a), however, have been criticized on a number of grounds. Sloan and Bagiella (2002) refuted the proposal that there is good evidence for a link between religion and health, directing much of their criticism to reviews of religion and cardiovascular health. Many studies examining religion and health are based on denominational differences, which Sloan and Bagiella pointed out do not really explain much about religion's connection to health outcome since they are focused either on denominations' associations with genetic predispositions, ethnicity, and health behaviors or on prevalence of disease among denominations. There are a number of studies where, even though religion was found to be a significant predictor of health, the actual study was not really about religion and health, but was actually undertaken for other reasons. Thus, religion in studies of health outcome has often been viewed as an afterthought or a

quaint finding. When religion has been quietly embedded in large studies, even significant findings are subject to suspicion since covariates or competing explanations often are not taken into account. Unfortunately, too, large studies through which a post-hoc analysis is made to look at the minor variable of religion arguably may be guilty of multiple comparisons and Type I error.

Although Sloan and Bagiella rightly illuminated the problems and sometimes misrepresentations of empirical studies indicating a positive influence of religion on cardiovascular health, this critique itself has faults, including some of the very same criticisms these reviewers had for the studies under review. For example, Sloan and Bagiella admittedly reviewed many studies based purely on perusal of study abstracts (a tactic that they had criticized authors of reviews concluding that there was a positive relationship between religion and health of having used). They also only reviewed a subset of health studies (cardiovascular disease), which in terms of its association with religion may or may not be reflective of all health/disease areas.

Regardless of their own methodology, Sloan and Bagiella highlight some of the limitations of the research to date on religion and health and certainly provide direction on how to improve investigations in this domain. More recent reviews, however, recommend that while improvements in methodology should always be sought, the evidence from past studies as a whole should motivate further inquiry into this area and not be summarily dismissed. As Miller and Thoresen (2003) recently encouraged, "Science proceeds not primarily through isolated studies, but through patterns in replication. Here we are impressed by the sheer volume and consistency of evidence,

albeit mostly correlational at present, pointing toward salutary effects of religion on health" (p. 32).

Purpose of the Present Study

The present study is concerned with contributing to this empirical body of research by delving further into the relationship between spirituality, religion, and health. While not every aspect of these relationships can be investigated, certainly smaller windows of approach are possible. Cardiovascular health has reportedly been more promising in terms of surfacing a religion/spirituality-health link than other disease/health categories (Powell, Shahabi, & Thoresen, 2003), and so the present study focuses on the particular population of those with cardiovascular disease. Furthermore, the theorized ways in which religion and spirituality may impact cardiovascular health correspond well with how risk factors are theorized to affect cardiovascular health. While other studies have measured certain aspects of religion or spirituality within this population, there does not appear to be any that have measured spirituality *and* religion and to have done so multidimensionally. Insofar as a correlational design allows, the present study attempted to capture spirituality and religion multidimensionally and then determine if there are associations with both health-related and psychological variables. The study was intended to be exploratory in such a way as to elucidate areas of religion and spirituality deserving of future study within cardiovascular samples.

Hypotheses

As the aforementioned empirical literature suggests, religion and spirituality have been implicated in mental and physical health outcomes, with most studies suggesting that the link is a healthful one. The present study attempted to enhance the understanding

of the relationship between religion/spirituality and cardiovascular health by measuring both religion and spirituality through more than one dimension. Furthermore, this study focused on the role religion and spirituality may have in psychological distress as well as in measures of health parameters in individuals with cardiovascular disease.

Thus, the first hypothesis of this study is concerned with which dimensions of religion and spirituality significantly predict psychological distress, namely, depression, anxiety, and hostility, in patients with cardiovascular disease. The second hypothesis is similar in that particular aspects of religion and spirituality are suggested to significantly predict blood pressure and self-reported health status in these patients.

CHAPTER 2: METHOD

Participants

Participants in this study were 51 adult patients who had known or suspected heart disease and who presented at cardiology clinics in urban Philadelphia with two or more risk factors for heart disease or heart disease symptomatology. Heart disease refers to any condition in which the heart is unable to function normally, including coronary artery disease, arrhythmias, myocardial infarction, and heart failure. The patients were recruited for participation in the study from two sites: an outpatient cardiology clinic and a nuclear cardiology service, both under the auspices of Drexel University College of Medicine and located adjacent to and within Hahnemann University Hospital, respectively.

Participation was open to both men and women between the ages of 21 and 80 years who were English-speaking, able to read at the 6th grade level, and who were able to give informed consent to participate in the study, including providing permission to release personal medical history and information to the investigators. Those excluded from participation were individuals who did not meet the above criteria as well as those who: were attending cardiology services for another medical reason (e.g., assessment for surgical procedures) without an inclusion-criterion heart disease diagnosis or suspected diagnosis; had been diagnosed with a cardiovascular disease not directly related to heart functioning (e.g., stroke); and had a current diagnosis of psychosis or dementia.

All basic demographic data are displayed in Table 1. Of the 51 participants, 29 were men and 22 were women with ages ranging from 21 to 78 years old, with a mean age of 56½ years. Racial and ethnic representations within the sample were

predominantly African American (43.1%) and Caucasian (45.1%), which mirror US Census data from 2000, showing that Philadelphia's population by major racial/ethnic groups consists of 45.0% White, 43.2% Black, 8.5% Hispanic/Latino, and 4.5% Asian (United States Census Bureau, 2000). The study sample was under-representative of Hispanic/Latino individuals. The majority of participants had graduated high school. Marital status was diverse, with 41.2% married, 13.7% single, another 13.7% separated, and 15.7% divorced, with another 15.7% widowed. Most of the sample were not regularly working outside the home, with 31.4% living on disability, 25.5% retired, 5.9% homemaking, and 5.9% unemployed. Only one participant worked part-time, while 23.5% of the sample was employed full-time. Of the 36 people who responded to the yearly income item on the questionnaire, the average income was approximately $42,500, with incomes ranging from $2,460 to $215,000.

Cardiac-related demographic information can be found in Table 2. Most of participants were on at least one medication that influenced blood pressure. Of those who responded to the question, the majority of participants were diagnosed with heart disease as their primary cardiac diagnosis. Close to one-third of the participants indicated that they had more than one cardiac diagnosis.

Regarding health behaviors, there were few individuals who reported smoking or drinking alcohol regularly; none endorsed using illicit substances (Table 3). Although the majority of participants endorsed refraining from consuming any caffeine, there was more variation in responses on this particular item (Figure 1).

Religious preference demographics are presented in Table 4. The majority of reported preferences were Roman Catholic (22.6%), followed by Baptist (15.1%), and Protestant/Nondenominational Christian (9.4%).

Measures

Religion/Spirituality

The Brief Multidimensional Measure of Religiousness/Spirituality (BMMRS; Fetzer Institute/National Institute on Aging Working Group [Fetzer-NIA], 1999) was developed in response to the confusion of measurement of spiritual and religious constructs. A partnership between the Fetzer Foundation and The National Institute on Aging facilitated a working group of social scientists well-versed in the area of spiritual and religious measurement. Based in large part on items from extant scales, the consensus group offered a multidimensional scale for use with mental health and physical health outcomes. The self-report BMMRS employs 38 items to touch on a number of areas of spirituality and religiousness that were thought to be the most salient in terms of connections to physical health outcomes. The BMMRS incorporates a number of subscales, as seen in Table 5.

In addition, the measure also asks individuals to provide overall ratings of the extent to which they consider themselves religious and spiritual. The measure primarily has a Likert-type response scale, although a few of the items are dichotomous or free-response. An altered, 33-item version of the measure was embedded in the 1997-1998 General Social Survey (GSS) and the measure in that form appeared to support the validity and reliability of this measure (Idler et al., 2003). Reliability varied between subscales from Cronbach's alpha reliabilities of .64 to .91. Content validity was assumed

to be good due to both the inclusion of items from pre-existing religiousness and spirituality scales as well as original items meant to increase content validity. Discriminant validity was established based on the minimization of overlap in item content amongst the domains of the measure. Convergent validity was also established when the BMMRS was correlated with stand-alone religious/spiritual-related items on the GSS. Despite this, the measure contains problematic items (e.g., commitment measured via exact monthly monetary contribution) and has been criticized for its overlap with constructs of psychological well-being (e.g., forgiveness; Koenig, McCullough, & Larson, 2001b, chap. 33). The measure, however, shows promise in covering the multidimensional aspects of religion and spirituality and does so using inclusive wording that allows the measure to be germane to various traditions of faith.

Psychological Distress

Two measures were used to assess psychological distress. Anxiety and depression were captured using The Hospital Anxiety and Depression Scale (HADS; Zigmond & Snaith, 1983). This 14-item self-report questionnaire uses a four-point Likert-type response scale and yields separate scores for anxiety and depression and was designed expressly to measure these constructs in medical outpatients (Johnston, Wright, & Weinman, 1995a). Often physical symptoms of medical conditions may obfuscate the presentation of anxiety and depression; the HADS attempts to detect anxiety and depression apart from such confounds. The brevity of the HADS and its sound psychometric properties advocate its use in a medical setting (Johnston, Pollard, & Hennessey, 2000). Internal reliability was found to have Cronbach's alpha of .93 for anxiety and .90 for depression in a sample of cancer patients (Moorey et al., 1991); good

construct validity was also determined. Concurrent validity was also judged to be good when the HADS was compared to psychiatric rating scales of the two constructs in an outpatient sample (Zigmond, & Snaith, 1983).

Another brief self-report questionnaire measured hostility. Two of the most common self-report measures of hostility are the Cook-Medley Hostility Scale, the Buss-Durkee Hostility Scale, and the Buss-Perry Aggression Questionnaire (BPAQ). While these are widely used in the empirical literature for both general hostility and the hostility within a cardiac population, both are considerably long measures (29-50 items). A newer measure of hostility, derived from the BPAQ, assesses cognitive, behavioral, and affective components of hostility (i.e., cynicism, antagonism, and anger, respectively) in a brief, eight-item, five-point Likert response questionnaire called the New-Buss (Gidron, Davidson, & Ilia, 2001). Like the HADS, the New-Buss was created for use in medical populations and preliminary data suggest that the New-Buss is highly correlated with other self-report measures of hostility (correlation of .92 to .94) and has moderate to satisfactory internal reliability (Cronbach's alpha of between .66 to .81). The New-Buss was correlated with measures of blood pressure and CAD severity in men younger than 60 years, although this finding was neither significant for men over 60 nor women (regardless of age). Gidron, Davidson, and Ilia cite similar trends in the hostility and CAD literature for divergent findings dependent on age and gender.

Health-Related Measures

Along with self-reported diagnosis of specific cardiovascular disease, both current diastolic and systolic blood pressure readings were obtained from the medical chart for the visit coinciding with completion of the other measures. As cited earlier, blood

pressure has been used in multiple studies as a marker for cardiovascular reactivity. Although the majority of cardiology patients are prescribed medications to lower high blood pressure, studies measuring religious variables have indicated that differences in blood pressure still remain after controlling for hypertensive medication use (Koenig et al., 1998).

A less direct measure of cardiovascular health was also employed in this study. Health status was assessed using Version 2 of the Short-Form-12 Health Survey (SF-12v2; Ware, Kosinski, Turner-Bowker, & Gandek, 2002). This is a brief, 12-item self-report measure of general health status, including both mental and physical health (Mental Component Summary (MCS-12) and Physical Component Summary (PCS-12), respectively). The SF-12v2 was derived from the Short-Form-36, a frequently used survey of health status that can be applied to specific populations (McDowell & Newell, 1996). The SF-12v2 retains the ability to cover the eight health domains that are measured in the SF-36: physical functioning; role limitations due to physical health problems; bodily pain; social functioning; general mental health; role limitations due to emotional problems; vitality, energy or fatigue; and general health perceptions. Each item is measured using a 5-point Likert-type scale (with the exception of two items which use a 3-point scale) and responses are made based on a standard, four-week recall (i.e., the respondent answers based on health over the past four weeks). The SF-12v2 has been found to have good internal consistency for the PCS-12 and the MCS-12 (Cronbach's alphas of .89 and .86, respectively) as well as for the subscales (ranging from .73 to .87) in samples of the US population. The SF-12v2 also demonstrates good concurrent validity with severity of medical condition as well as between patients and healthy adults.

Correlations between the SF-36 and the SF-12v2 indicate good construct validity. Normative data for the SF-12v2 have been established on a number of chronic conditions, including both heart disease and hypertension (Ware et al., 2002).

Demographic Characteristics

Demographic characteristics important to this area of research were also collected using a brief questionnaire. Characteristics included age, gender, race/ethnicity, marital status, yearly income, primary cardiac diagnosis, comorbid diagnoses, cardiac/hypertensive medication, and frequency of smoking, alcohol, caffeine and drug use.

Procedure

Participants in this study were approached at the recruiting sites by study recruiters under the permission of the attending physician from July 2004 through May 2005. Access to patient medical records was given in advance of recruitment in order to pre-determine those patients who met inclusion criteria (insofar as this could be ascertained from the medical chart). Patients were asked if they would be interested in participating in the research study and a description of the study was provided. When the patient expressed interest in participation, the recruiter assessed the patient in order to determine if he or she met the remaining inclusion criteria. When inclusion criteria were determined to be satisfied, the recruiter proceeded with obtaining informed consent. The participants were informed that participation was completely voluntary and that declining to participate would not negatively affect their medical care. Furthermore, they were informed that their consent to participate in the study could be revoked at any time, again with no adverse ramifications towards their medical care.

Participants reviewed along with the recruiter a detailed consent form approved by the Office of Research Compliance at Drexel University. The consent form described the purpose of the study, procedures, risks and inconveniences, benefits, economic considerations, confidentiality, voluntary participation, injury clause, health information disclosure, and contact information of investigators. A personal copy of the consent form was provided to each participant.

Once informed consent was given through signature, the participant was then given the measures pertaining to demographic information, religiousness/spirituality, health status, and psychological distress. As part of consenting to participate in the study, the patient's permission was requested in order to obtain diagnosis, medication information, and blood pressure readings resulting from the current visit from the medical chart. All collected data, including measures, medical information, and consent form, is kept in locked files, accessible only to authorized research personnel. Total time for administration of all measures varied, but on average took 20-30 minutes for patients to complete. If participants were unable to complete all measures due to time constraints, a pre-paid postage envelope addressed to the investigator was provided to the participants in which they could return completed remaining measures.

Statistical Analyses

All data was analyzed using SPSS software (11.0.1 version). Descriptive statistics were run on all demographic and dependent variables in order to look at central tendencies and variability of the data. When the data were found to be in violation of inferential statistical assumptions, the data were transformed accordingly. Once

assumptions were assured to hold for the current data, the main hypotheses were tested via regression analysis.

A correlation matrix was created involving the demographic variables and the dependent variables. When significant relationships occurred, these demographic variables were used in the regression analyses. Next, another correlation matrix was developed that ascertained any significant relationships between the religious/spiritual measure subscale scores and the scores from the dependent variables measures as well as blood pressure readings. Significant correlations were used to help identify pertinent predictor variables for regression in order to minimize potential for committing Type I error in multiple regression analyses. Multiple regressions were then performed for each dependent measure with significant religious/spiritual variables as predictors, along with significant demographic variables entered into the regression as a block. These analyses made possible a better understanding of the relationship between religious/spiritual variables and the dependent variables while controlling for any variance accounted for by demographic variables. Differences amongst categorical demographic variables on the dependent variables were also examined via multiple analyses of variance. Further analyses were performed to examine any differences in certain religiousness/spirituality subscale scores among levels of demographic factors, specifically those of age, race, gender, and cardiac diagnosis.

CHAPTER 3: RESULTS

Distribution of Psychological Distress and Physical Health Variables

In analyzing the data, the dependent variables of psychological distress and physical health were viewed and checked for normality and adherence to regression assumptions. Both depression and anxiety scores from the HADS were positively skewed, as was the New-Buss hostility scale scores; each set of scores was transformed by using the square root of the scores and this helped to establish normality as seen in Figure 2. Blood pressure readings and physical health status were all normally distributed (Figures 3 and 4). Mental health status was negatively skewed upon initial inspection. After transforming this variable through squaring, the distribution was normal with the exception of one outlier (Figure 5); however, the exclusion of this point from the data did not appear to be unduly influential in analyses.

Religious/Spiritual Variables Interpretation

In discussing the results, all dependent variables were designed so that a higher score indicated a higher level of that particular construct (e.g., higher scores on depression scale relate to higher depressive symptoms). This is not the case with the continuous religious and spiritual variables; on these, a lower score is representative of a greater degree of the construct being measured (e.g., a low score on the forgiveness subscale is indicative of engaging in more forgiveness). There are four exceptions to this inverse pattern: the three personal religious/spiritual history items (which deal with ages) and the commitment subscale. Also, because the religious coping and religious support variables were comprised of positive and negative elements, these subcomponents were analyzed separately, using positive and negative religious coping, and congregation

benefits and problems. Finally, the commitment subscale score was a composite score of overall religious commitment, percent of yearly income contributed to congregation or religious causes, and number of hours per week spent in activities for religious or spiritual purposes.

Correlations

When continuous independent variables were correlated with the dependent variables, there were a number of significant results, as can be seen in Table 6. Although a strict significance level of 0.05 was used throughout these analyses, there were some correlations that approached 0.05 and could be considered trends in the data; these are also presented in Table 6. Potentially, if the sample were larger and more powerful, these trends may have emerged as significant. Also of note is that no variables were significantly correlated with the Mental Component Summary of the SF-12v2 or with diastolic blood pressure. The religion and spirituality variables of daily spiritual experiences, values/beliefs, religious and spiritual coping, and general self-ranking of both religion and spirituality were unrelated to any psychological or health variables studied.

Predictors of Psychological Distress Variables

Current Age, Smoking, Religious Support (Congregation Benefits), and Depression

Although congregation benefits only approached significance in relation to depression, it was entered into the regression of depression on predictor variables. When smoking, religious support, and age were entered as predictor variables of the HADS Depression Subscale in a multiple regression, the resulting equation accounted for 28.8% of the variance in depression scores. Smoking was a significant predictor of depression

(b=0.052, S.E.=0.025, p=0.049, 95% C.I.=0.002-0.102) as was age (b=-0.026 S.E.=0.012, p=0.039, 95% C.I.=-0.050-(-0.002), and religious support (b=0.204, S.E.=0.089, p=0.028, 95% C.I.=0.026-0.382) was also a significant predictor. This equation indicates that those who had less religious support tended to have higher depression scores, when controlling for age and smoking.

Religious Support (Congregation Benefits), Gain in Faith Age, Current Age, and Anxiety

As religious support, age at experiencing a gain in faith, and current age were significantly correlated with the dependent variable of the HADS Anxiety Subscale, they were entered into a multiple regression to predict anxiety scores. In an equation that accounted for 32.0% of the variance in anxiety scores, only religious support (b=0.305, S.E.=0.139, p=0.041, 95% C.I.=0.027-0.583) was found to significantly predict anxiety, while current age (b=-0.030, S.E.=0.025, p=0.254, 95% C.I.=-0.080-(0.020)) and gain in faith age (b=-0.021, S.E.=0.024, p=0.404, 95% C.I.=-0.069-0.027) were not found to be significantly predictive of anxiety scores. Thus, those who had less religious support predicted higher anxiety scores.

Caffeine and Hostility

Caffeine was entered into regression analysis as a predictor variable of the New-Buss scale of hostility and it accounted for 18.9% of the variance in hostility (b=0.034, S.E.=0.011, p=0.004, 95% C.I.=0.012-0.056). Thus, greater weekly caffeine consumption was predictive of greater hostility in this sample.

Predictors of Physical Health Variables

Organized Religiousness and Systolic Blood Pressure

Scores on the organized religiousness subscale significantly predicted systolic blood pressure (b=1.876, S.E.=0.903, p=0.044, 95% C.I.=0.07-3.682) and accounted for 9.1% of the variation in the dependent variable. As lower scores on the organized religiousness subscale indicate greater organized religiousness, the results indicate that lower organized religiousness is related to higher systolic blood pressure.

Current Age, Loss in Faith Age, and Physical Health Status

In the correlations between demographic, religious/spiritual variables, and Physical Component Scale of the SF-12v2, both current age and age at which one experienced a loss in faith were significantly correlated with physical health status (r=0.407 and r=0.989, respectively). However, as only four participant data points existed for loss in faith age, this variable was dropped from further analyses.

Having removed the loss in faith age variable from consideration, a regression was performed which regressed physical health status onto only current age. This analysis showed that current age was a significant predictor of physical health status (b=0.345, S.E.=0.131, p=0.013, 95% C.I.=0.083-0.607) and accounted for 16.5% of the variance in physical health status. In this sample, greater self-reported physical health status was predicted by increased age.

Categorical Demographic Variables

All results from multiple analyses of variance conducted with categorical demographic variables and the psychological and physical dependent variables can be viewed in Table 7. Also in Table 7 are the results of MANOVAs using categorical

religious and spiritual variables as independent variables with the main dependent variables.

Marital Status

When marital status was examined in relation to the major dependent variables, the MANOVA was significant at F(28,112) = 1.653, p=0.035. Post-hoc univariate analyses found that significant differences existed between marital classifications in anxiety scores (F(4,31) = 5.283, p=0.002). Specifically, widowed participants had significantly lower anxiety scores (mean=0.683, S.D.=0.843) than both the participants who were single (mean=3.237, S.D.=0.781) and those who were divorced (mean=2.992, S.D.=11.200).

Employment

The categorical independent variable of employment was entered into a MANOVA with all the dependent variables. This was significant: F(28,112) = 1.748, p=0.022. Post-hoc univariate analyses revealed two significant relationships. There was a significant difference in hostility scores between those participants who were unemployed and those who were retired (F(4,31) = 2.842, p=0.041). The unemployed participants had a significantly higher mean hostility rating (5.009, S.D.=0.600) than the retired participants' mean rating (3.805, S.D.=0.499). With physical health status, post-hoc analysis indicated a significant difference between full-time workers and those on disability (F(4,31) = 5.222, p=0.002). Those in full-time employment had a significantly higher mean physical health status ranking (44.416, S.D.=8.118) than participants living on disability (28.455, S.D.=8.852).

Demographic and Spiritual/Religious Variables

Selected demographic variables were chosen for further analysis with spiritual and religious variables. The continuous variable of age was significantly correlated both with age at having a life-changing religious/spiritual experience ($r=0.511$, $p=0.013$) and with age at having a gain in one's faith ($r=0.643$, $p<0.001$). In a MANOVA that examined differences in some of the religious and spiritual variables (i.e., daily spiritual activities, values/beliefs, forgiveness, private religious practice, religious and spiritual coping, religious support, organized religiousness, and commitment) between only African American and Caucasian participants, the overall analysis was only close to statistically significant, $F(20,28) = 1.806$, $p=0.074$, with univariate analyses indicating that there was a significant effect of race on private religious practice ($F(2,22) = 5.144$, $p=0.015$). The mean for African Americans was significantly lower (13.846; S.D.=7.221) than that for Caucasians (24.546; S.D.=10.802), indicating that African Americans were more likely to engage in private religious practices. A similar finding appeared for commitment ($F(2,22) = 16.410$, $p<0.001$). Again, African American participants' mean score (11.599; S.D.=9.110) suggested that they demonstrated more commitment in comparison to their Caucasian counterparts (mean score=7.080; S.D.=7.109). Using the same subset of religious and spiritual variables as dependent variables, MANOVAS involving gender, primary cardiac diagnosis, and religious preference were found to not be significant ($F(8,16) = 1.033$, $p=0.452$; $F(24,48) = 1.254$, $p=0.248$; and $F(16,32)=1.117$, $p=0.381$, respectively).

Chi-square analyses were used to examine select demographic and religious and spiritual variables Specifically, gender, race, religious preference, and religious/spiritual

history were examined together for any emerging patterns using chi-square analyses (Table 8). Three sets of significant differences in observed and expected frequencies involving racial demographics were found, as can be seen in Tables 9, 10, and 11. Roman Catholic participants were more likely than expected to be Caucasian whereas African American participants were more likely than expected to be Baptist or one of the other Protestant traditions. African American participants were also more likely than expected to have had a religious/spiritual life-changing experience as well as more likely to have experienced a gain in faith.

CHAPTER 4: DISCUSSION

Psychological Distress

Religious Support, Depression, and Anxiety

Religious support, specifically congregation benefits, was a significant predictor of HADS depression scores even when smoking and age were taken into consideration statistically. Participants who derived positive support from their congregations were predicted to have less depressive symptoms. Similarly, the psychological risk factor of anxiety was significantly predicted by only religious support, while controlling for current age and age at gain in faith influences, with those having greater perceived religious support indicating lower scores on the anxiety subscale of the HADS. These results indicate a robust connection between religious support and two of the psychological risk factors for cardiovascular disease.

Religious support, which on the BMMRS is comprised of four items pertaining to anticipated support from coreligionists (congregation benefits) and negative interactions with coreligionists (congregation problems), has been conceptualized as social support specifically involving others of one's religious congregation or community. The particular questions on the religious support subscale are derived from similar items on secular social support inventories. This is because the construct of religious support mirrors that of general social support, as does its theoretical position in the relationship with health and medical outcomes (Krause, 1999). Essentially, social support is thought to provide a buffer against stressors and their sequelae, including anxiety and depression, and decrease the risk of cardiovascular disease and even mortality (Greenwood et al., 1996; Hughes, Tomlinson, Blumenthal, Davidson, Sketch, & Watkins, 2004). In this

sample, the congregational benefits aspect of religious support appears to have similar characteristics. In particular, religious social support may include an expectation within the religious community that others will help one another and be there for one another in times of need. The community may encourage healthful behaviors and instill a sense of integration and belonging that is comforting and reassuring to the individual. These aspects of religious support would in turn work against hopelessness and fear, depression and anxiety.

Forgiveness and Anxiety

Although the relationship between forgiveness and anxiety in this sample did not reach statistical significance at the .05 level, it was significant at the .10 level. Forgiveness is a construct that has received increasing empirical attention in recent years as it relates to cardiovascular health (Lawler, Younger, Piferi, Billington, Jobe, Edmondson, & Jones, 2003; Lawler, Younger, Piferi, Jobe, Edmondson, & Jones, 2005; vanOyen Witvliet, Ludwig, & Vander Laan, 2001). In addition to lower blood pressure, greater ability to forgive is associated with decreases in anxiety and depression (Enright, Gassin, & Wu, 1992). One potential difficulty with the construct of forgiveness is that it is both a secular and a religious/spiritual concept. Indeed, the aforementioned studies used a secular interpretation of forgiveness and did so primarily examining the participants' ability to forgive others. Measuring forgiveness from a religious or spiritual perspective requires some re-contextualizing of forgiveness, and the BMMRS does this by not only measuring the degree to which respondents forgive others, but also the degree to which respondents forgive themselves and the degree to which respondents know that they are forgiven by God. These items appear to give religious/spiritual forgiveness more

determinants than secular forgiveness measures and possibly explain why forgiveness did not achieve conservatively significant associations in this study.

Caffeine and Hostility

None of the religious or spiritual variables predicted hostility scores; however, caffeine consumption and employment status were significantly associated with hostility. While caffeine remains controversial as a corollary of cardiovascular disease development, the present results are compatible with findings in the hostility literature suggesting that caffeine is correlated with hostility and that they both can impact cardiovascular functioning (Smith, Cranford, & Green, 2001; Calhoun, Bosworth, Siegler, & Bastian, 2001).

Physical Health

Organized Religiousness and Systolic Blood Pressure

Organized religiousness was the single variable that significantly predicted systolic blood pressure. Those participants who endorsed greater religiousness within an organized context had relatively lower systolic blood pressure readings at same-day clinic visit. Organized religiousness, as measured on the BMMRS, involves the traditional religion item of frequency of religious services attendance. In addition, it incorporates frequency of religious/spiritual-related activity attendance at places of worship apart from actual services (e.g., choir practice, special interest groups, and volunteer activities). Although traditional in studies of religion and spirituality, the organized religiousness construct has been considered "loaded" in that it is thought to be comprised of various components of religious and spiritual experience that take place within the confines of religious services. The multidimensional nature of the BMMRS employed in this study

was thought to have the ability to discriminate some of these components and their individual influence on psychological and health variables. In this study, however, organized religiousness maintained its traditional connection with health—*by itself*. Organized religiousness appeared to measure the holistic experience of worshiping and participating within organized religion's opportunities (e.g., prayer, ritual, atmosphere of service and environment, specific social interests and activities) and that frequency of exposure to such opportunities is important to cardiovascular health. This finding points to the possibility that, rather than any one or two aspects of religion/spirituality accounting for associations with health, there may be an integrative, combined presentation required for religion and spirituality to be implicated in cardiovascular health. Organized religiousness may be helpful to better health because frequent exposure to organized religion services and activities could reinforce healthful behaviors and practices, increase social contact and support, provide a continuous context for understanding health problems that allows a person to adjust to and cope with health problems, and could also provide a sense of belonging and incorporation into a larger social, historical, and spiritual community.

Current Age and Physical Health Status

Only age emerged as a significant predictor of physical health status. Participants who were younger tended to rate their physical health status as poorer while older participants endorsed higher physical health status. Although this is contrary to the typical understanding that physical health declines with age, the younger individuals in this sample deserve special consideration. Younger patients who are seen in the participating cardiology clinics largely do have significant cardiovascular concerns that

are uncommon for people of their age. The younger participants in this sample most likely actually have serious cardiac problems and are more physically compromised by their cardiovascular problems than older participants. Furthermore, because the Physical Component Scale of the SF-12v2 includes items of being limited in performing physical activities, pain, and fulfilling physical roles, a younger individual can be more impacted by health problems due to his or her own expectations as well as larger societal expectations.

Age at Loss in Faith and Physical Health Status

Although physical health status and age when one experienced a loss in faith were significantly correlated, only four of the participants even endorsed having such an experience. The notion that a loss in faith at an older age is associated with better physical health status is tentative at best. At least for the four individuals who expressed having had a major loss of faith at some point in their life, physical health status appears relevant in that those whose loss of faith occurred at a younger age may not rate their physical health status as high. Religious/spiritual history variables are discussed further in a subsequent section.

Mental Health Status (SF-12v2 MCS)

The Mental Component Scale of the SF-12v2 did not correlate with any other variable entered into analyses and differences between various groupings of participants did not uncover any significant differences on this measure. Because this study was more concerned about the physical aspects of health as measured on the SF-12v2, the lack of significant findings associated with mental health status is comparatively inconsequential. Why significant findings for the psychological distress variables did not surface in

relation to the MCS scores may reflect the specificity of the anxiety, depression, and hostility risk factors as measured by the HADS and New-Buss questionnaires. The MCS is much more general in its purview of psychological distress (e.g., energy, carelessness, feeling calm) and this may explain why it failed to be implicated in any relationships.

Demographic Variables

Religious Preference

The study sample somewhat reflected known religious affiliation patterns in the Philadelphia area. Data from the *Religious Congregations and Membership in the United States 2000* (Association of Statisticians of American Religious Bodies, 2002) showed that, of those who claimed a particular religious affiliation, 61% were Roman Catholic, by far the largest religious affiliation. In the present study sample, non-Roman Catholic Christians accounted for 43.4% of those responding to the religious preference question, while 30.8% responding were Roman Catholic. The ASARB data also would suggest that those of the Jewish, Episcopal, Lutheran, Presbyterian and Muslim faiths would be more highly represented in the study sample, while Baptist affiliation would have been represented to a lesser degree. Thus, the religious affiliation of the sample does not appear to be fully reflective of the proportions of faiths in the large community.

Employment Status

Employment status, specifically those who were unemployed versus retired, were found to be associated with differing mean hostility scores, with the unemployed rating greater hostility. Research exists that supports the idea that unemployment and hostility are associated and that both affect health negatively (Elovainio, Kivimaki, Kortteinen, & Tuomikoski, 2001; Kivimaki, Elovainio, Kokko, Pulkkinen, Kortteinen, & Tuomikoski, 2003). Particular employment statuses were also found to differentiate physical health

status scores. Those participants in full-time employment rated significantly higher physical health than did those who were living on disability. This finding makes intuitive sense, as those with disability by definition would be physically compromised whereas full-time workers most likely are more able-bodied.

Marital Status

Differences in anxiety scores between widowed and both single and divorced participants are difficult to characterize. Reviewing the data, widowed participants tended to be older than single participants. One study of cancer patients found that older widowed, divorced, or single patients had more emotional support than their younger counterparts (Schwarzer, Knoll, & Rieckmann, 2004), and possibly a similar pattern is occurring in the present cardiovascular sample, with greater anxiety occurring with less emotional support. In the current sample, widowed participants also were more likely to be women; single and divorced participants were more likely to be men. Among other findings, divorced and single men were found to be at greater risk for cardiovascular disease than were their female counterparts in a study by Gliksman, Lazarus, Wilson, & Leeder (1995). However, studies have not focused on anxiety and marital status in cardiovascular patients and the relationship remains ill-defined.

Age

The matter of age was intriguing in this study, both current age as well as the age at which people had seminal religious/spiritual experiences in their lives. For anxiety, current age and age at which someone experienced a gain in faith were significantly correlated; however, both age variables were highly correlated with one another as well. Age was significantly correlated with anxiety, with younger participants endorsing higher

levels of anxiety, but it was not a significant predictor of anxiety once beneficial congregation support was considered. The reason for the relationship is unclear, especially as no causal reference can be ascertained. One speculation is that younger participants may be more "caught unawares" of their cardiovascular situation, in that they may not have expected to have such medical problems at a young age, whereas older participants may have had expectations of or had time to adapt to their medical problems with age. As with the relationship between age and physical health status, younger participants in this sample most likely have serious cardiovascular problems, and thus their increased anxiety is understandable. This pattern also could be interpreted as individuals simply gaining life experience with age, gaining perspective, which helps to alleviate anxious tendencies. Another interpretation of the age factor is that younger individuals in the study had a history of anxiety that preceded cardiovascular disease and potentially contributed to the development disease. Quite possibly, both strains of effect could be at play in cardiac populations, as the age and anxiety correlation has been found by other researchers (Hughes et al., 2004).

Religious/Spiritual History

Seminal religious/spiritual experiences and the age at which they occur is a difficult area to understand at this juncture, not only in the present study but also as a construct. On the BMMRS, the religious/spiritual history items are laid out as yes/no responses and ask whether one has had a life-changing religious/spiritual experience, a gain in one's faith, or a loss; the questions also ask for age at the time of the experience. Although all three are on the measure, only the question regarding life-changing experience has really been studied and found to have a relationship with better health; the

other two items are for experimental purposes (George, 1999). Of the many subscales on the BMMRS, religious/spiritual history is perhaps the most investigational, with researchers in controversy as to whether to conceptualize the items as history or intense religious experience.

The correlation with current age of both age at life-changing experience and age at gain in faith in this sample raises questions about what the construct of religious/spiritual history means. Perhaps, as one ages, a person's perspective increases in range and this accounts for the correlation. For example, what appears as a seminal religious/spiritual experience at age 25 pales in comparison with other experiences as life is lived, leaving the 60-year-old with a more recent event to identify that is more salient. Again, this relationship requires further study to more fully understand the correlation.

Race and Religious/Spiritual Variables

Another finding regarding religious/spiritual history is its relationship with race. When racial groups were compared on the occurrence of religious/spiritual history items, African Americans were more likely than Caucasians to have had both a religious/spiritual life-changing experience and a significant gain in their faith. These results mesh with previous reports of high religiosity in African Americans (Oman et al., 2002; Krause, 2004). Furthermore, in comparison to Caucasian participants, African American participants were found to engage in private religious practices more often and also to have greater religious commitment. Private religious practices are the non-organizational religious activities in which people engage, such as private prayer, meditation, saying blessings or grace at meals, and use of religious media (e.g., television, radio, reading scripture or other religious texts). Religious commitment

focuses on one aspect of what can be considered intrinsic religiousness, a construct that involves an individual possessing a deeply held religion that permeates throughout his or her experience and that is continuous, in that its goal is spiritual in nature and involves ideas of a better world and unselfishness (Pargament, 1997, p.63). Commitment is theoretically linked with other forms of intrinsic religiousness like religious service attendance (Williams, 1999). These findings regarding private religious practice and commitment are compatible with previous racial differences found in cardiac patient samples (Koenig et al., 1998).

Taken as a whole, the findings point to beneficial congregational support being particularly important in attenuating psychological distress of anxiety and depression. Additionally, organizational religiousness was significant in relation to systolic blood pressure. Interestingly, despite using a multidimensional measure of religion and spirituality, these more traditional concepts of, essentially, social support and frequency of organized religious activities, continue to come forward from the data when links to cardiovascular health are examined. Breaking up religion and spirituality into their constituent parts has been a helpful advance in the measurement of religion and spirituality as constructs; indeed, the general self-ratings of both religiousness and spirituality in this sample were uncorrelated with any psychological distress or physical health variables. The current findings signal that even in the deconstruction of religion and spirituality concepts within the context of cardiovascular disease, religious attendance and social support remain key factors.

Limitations

According to reviewed effect sizes of studies finding correlations between religion/spirituality and cardiovascular disorders, effect size for the current study was estimated to be modest (Powell, Shahabi, & Thoresen, 2003). According to Cohen (1992), a correlation conducted using a small effect size, an α-level of .05, and power at 80% would necessitate a sample size ranging in the hundreds. This number of participants was prohibitive to the resources of the current investigation. Although statistically significant results were found with the final sample size of 51, insufficient power remains a major limitation of this study. Potentially, associations between non-significant religious and spiritual variables (e.g., daily spiritual experiences, values/beliefs, religious and spiritual coping) in this study and variables of psychological distress and physical health may show to be statistically significant with adequate power. Furthermore, the number of analyses run, while helpful to better characterize the sample and study questions, was too numerous for the small size of this sample and thus the results of this study must be approached very cautiously until they can be replicated with a much more substantial sample size.

Given the considerable statistical limitations of this study, the multidimensional exploration of religion and spirituality in relation to cardiovascular disease remains a promising and important pursuit. Despite the limitations, there is value in viewing the data qualitatively. Qualitatively analyzed results not only provide another approach to informing the research question but can also guide the direction of future research in the area. For example, evaluating which religious or spiritual constructs are more or less implicated in psychological distress will lead to more specific development of hypotheses

and allow for streamlined research in future studies. Thus, in this study, those variables that approached significance (e.g., forgiveness) were not out-rightly dismissed as unimportant in considering connections between religion/spirituality and cardiovascular health. Further supporting the idea of qualitative study is the ongoing nature of the development of the BMMRS. Although the current measure has been task-forced into creation, the working-group very much considers this measure a work in progress, with its implementation in various on-going studies crucial to its refinement (Fetzer-NIA, 1999).

This study is also limited by its cross-sectional nature. Associations found are correlational and cannot be spoken about in terms of causality. Until the associations can be measured longitudinally or prospectively, any causal pathways between the variables remain theoretical. Thus, whether organized religiousness causes cardiac patients to have relatively lower systolic blood pressure or whether those individuals who are in better cardiovascular health are better able to engage in organized religion has yet to be ascertained. Likewise, religious support could be a precursor for less anxiety and depression in cardiovascular patients—or this relationship may work in the opposite way, with those who are less depressed or less anxious being better able to access the support available in religious communities.

The composition of the sample also was somewhat problematic. In order to cast a wide net during the recruitment of participants, the type of patients included were quite diverse in terms of their cardiac diagnoses and status (e.g., arrhythmia versus heart transplant). A more homogenous cardiac sample perhaps would have given better definition to the physical health measures, or even provided a more exact measure of

cardiac functioning (e.g., number of implanted cardiac defibrillator shocks). The sample, while sufficiently representative of the Philadelphia area, was heavily concentrated in African American and Caucasian participants, as well as in Roman Catholic, Baptist, and Protestant/Christian adherents. Other racial and ethnic populations (e.g, Asian, Native American, Hispanic/Latino) and religious preferences (e.g., Jewish, Buddhist, Muslim, Hindu) require greater sampling in order to further clarify the relationship between religion and spirituality and cardiovascular health.

Clinical Implications

The implications of the findings of this study add to the knowledge of how individuals with cardiovascular disease can benefit from spiritual and religious factors in their lives. The results echo that certain of these factors do relate to positive health and well-being, and suggest that spirituality and religion are worthy of increased attention by the healthcare system at-large. This is not to advocate that religion and spirituality become forced or compulsory ingredients to healthcare. Undoubtedly, there is real concern that the implications of spirituality and religion in health may lead to their blanket introduction into healthcare services and potentially lead to abuses by healthcare professionals (e.g., persuasion and discrimination based on religious/spiritual beliefs). Fortunately, there presently is no evidence to suggest that such abuse is occurring at a level higher than other unethical behavior (Miller & Thoresen, 2003). Increased consideration by the healthcare system hopefully would incorporate optional rather than forceful elements of religion and spirituality, if these elements continually are found to be mentally and physically healthful for patients. For example, the nursing profession has already begun to view prayer and meditation practices as emergent forms of

complementary and alternative therapy recognized as being helpful to cardiovascular patients (Kreitzer & Snyder, 2002). Likewise, consideration by healthcare professionals of patients' religious/spiritual beliefs and practices could lead to better orchestration of continuity of spiritual care (i.e., referral to clergypersons and chaplains) for medical patients (Koenig, 2001c). Given the positive association found between mental health and religious support, and physical health and organized religiousness, continuity of spiritual care appears highly relevant. For example, health professionals' awareness of patients' access to chapels and meditation rooms in hospitals, as well as to religious services and events, can be emphasized.

Co-ordination of spiritual care appears to be useful, especially for when the patient is no longer directly involved with the healthcare system. This already has been seen in those recovering from CABG surgery. Post-operative adjustment and quality of life become important issues for rehabilitation but unfortunately long-term aftercare is not always adequate. Religious and spiritual connections and practices may afford relief from adjustment problems when aftercare is not sufficient or is unavailable to the individual (Ai et al., 1998). This is important, as the expense of the operation, if not balanced by subsequent improved quality of life, may not in the end be the best allocation of resources, especially if the individual will only suffer further complications and problems related to the cardiovascular condition. If spiritual/religious factors do work to improve long-term outcome—and decrease overall cost of care—then these factors merit further appreciation by the healthcare system. The results of the present study lend cross-sectional support to this idea.

Furthermore, the clinical implications extend to preventive healthcare in that finding ways to connect cardiac health education and exercise with faith communities may yield further health benefits. Working within the structures of established religious networks, the concepts of healthy cardiovascular living can be supported and reinforced within the patient's religious/spiritual network. Such programs are currently implemented, especially within African American religious communities, and have been quite promising in their ability to support cardiac health (Yanek et al., 2001).

Future Research

The exploration undertaken in the present study points to the need for continued research into the interface of religion, spirituality, and cardiovascular disease variables. In moving forward from this study, the use of the BMMRS with a larger sample and with a more cohesive and narrowly defined cardiac group (e.g., those recovery from heart transplant surgery, those in recovery from myocardial infarction) could assist in firming up the exact linkages between religion/spirituality and cardiac outcome. Special focus can be given to organized religiousness, religious support, religious/spiritual history, and forgiveness, along with secular comparison measures of these constructs (e.g., non-religious social support and forgiveness). If comparison measures are used in conjunction with religious and spiritual ones, future studies will be better able to parse out the specific contributions of religion and spirituality from secular ones.

The ability to study religion/spirituality and cardiovascular health dynamically across time would also be helpful in better understanding the relationship between the two. This also would aid in building and supporting theoretical causal avenues between the relationships. Measuring religious and spiritual variables before and after surgery,

cardiac rehabilitation, and even before and after cardiac events such as heart attacks, would assist in elucidation of how religion and spirituality work in influencing health.

Finally, the current state of research is such that most of the research continues to be conducted with primarily Roman Catholic and Protestant Christian samples. Extending research to incorporate other religions and spiritual systems would be highly valuable in attempting to understand the impact of religion and spirituality in all their forms on cardiovascular disease. The BMMRS could be used in such endeavors, as it was designed to be comprehensive to most religious and spiritual persons, but its more frequent implementation with non-Judeo-Christian religious and spiritual populations could help improve its ability to measure religious and spiritual constructs and in doing so facilitate greater understanding of relationships between religion, spirituality, mental health, and physical health.

CHAPTER 5: SUMMARY AND CONCLUSIONS

This study found significant relationships between cardiovascular health and certain aspects of spirituality and religion. Spirituality and religion were associated with both psychological risk factors for cardiovascular disease as well as with the physical cardiovascular health indicator of systolic blood pressure. Specifically, beneficial congregational support and organized religiousness were highlighted as important concepts in terms of predicting less depression, anxiety, and lower systolic blood pressure. Other relevant religious and spiritual factors were noted as well, including religious/spiritual history and forgiveness. The results support previous findings in the field and point towards the need for further research and definition of the connection between religion, spirituality, and cardiovascular health.

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Appendix A: Tables

Table 1. Frequencies and distributions of basic demographic variables.

DEMOGRAPHIC VARIABLE	N	MEAN	STANDARD DEVIATION	RANGE
Age	46	56.46	13.256	21-78
Household Yearly Income	36	$42,496.03	$50,102.70	$2,460-$215,000
	N	PERCENTAGE		
Gender				
Male	29	56.9%		
Female	22	43.1%		
Race				
Asian	2	3.9%		
African American	22	43.1%		
Caucasian	23	45.1%		
Native American	1	2.0%		
Hispanic/Latino	1	2.0%		
American Indian/Black	1	2.0%		
Native American/Latino	1	2.0%		
Education				
Some high school	8	15.7%		
High school graduate	17	33.3%		
Some college	12	23.5%		
College graduate	8	15.7%		
Graduate degree	4	7.8%		
Unknown	2	3.9%		
Marital Status				
Married/partnered	21	41.2%		
Single/never married	7	13.7%		
Divorced	8	15.7%		
Separated	7	13.7%		
Widowed	8	15.7%		
Employment				
Working full-time	12	23.5%		
Working part-time	1	2.0%		
Retired/not employed outside the home	13	25.5%		
Homemaker	3	5.9%		
Unemployed	3	5.9%		
On disability	16	31.4%		
Unknown	3	5.9%		

Table 2. Frequencies of cardiac demographics.

CARDIAC VARIABLES		N	PERCENTAGE
Cardiac Medications			
	None	5	9.8%
	At least one	30	58.8%
	Unknown	16	31.4%
Major Cardiac Diagnosis			
	Heart Disease	22	43.1%
	Arrhythmia	5	9.8%
	Heart Transplant	8	15.7%
	Hypertension	1	2.0%
	Other	3	5.9%
	Unknown	12	23.5%
More than One Cardiac Diagnosis			
	No	15	29.4%
	Yes	16	31.4%
	Unknown	20	39.2%

Table 3. Statistics of health behavior demographics.

HEALTH BEHAVIORS	N	MEAN	STANDARD DEVIATION	RANGE
Alcohol	48	0.396 units/week	1.280	0-7.0
Caffeine	44	3.216 units/week	7.766	0-35.0
Drugs	48	0.000 units/week	0.000	0
Smoking	49	1.430 cigarettes/week	5.774	0-30.0

Table 4. Frequencies of religious preferences.

RELIGIOUS PREFERENCE	N	PERCENTAGE
Roman Catholic	12	22.6%
Baptist	8	15.1%
Protestant/Nondenominational Christian	5	9.4%
Jewish	3	5.7%
Methodist	3	5.7%
Holiness	2	3.8%
Jehovah's Witness	2	3.8%
Pentecostal	2	3.8%
African Methodist Episcopal	1	1.9%
Buddhist	1	1.9%
Presbyterian	1	1.9%
United Church of Christ	1	1.9%
No response to item	12	22.6%

Table 5. Subscales and sample items from the Fetzer-NIA Brief Multidimensional Measure of Religiousness/Spirituality.

Subscale	Sample Item
Affiliation	What is your religious preference?
History	Did you ever have a religious experience that changed your life?
Daily Spiritual Experiences	To what extent can you say you experience feeling God's presence?
Values and Beliefs	Do you believe there is life after death?
Forgiveness	Because of my religious beliefs, I have forgiven those who hurt me.
Private Religious Practices	Within your religious or spiritual tradition, how often do you meditate?
Religious and Spiritual Coping	Think about how you try to understand and deal with major problems in your life: To what extent do you work together with God as partners?
Religious Support	If you were ill, how much would the people in your congregation help you out?
Commitment	During the last year, how much money did you…contribute to your local congregation?
Organizational Religiousness	How often do you attend religious services?

Table 6. Correlations between demographic variables, BMMRS scales, psychological distress, and health status variables.

VARIABLES	PEARSON'S R	P-VALUE (*SIG.)	N
Age			
Physical Health	0.407	0.013*	37
Depression	-0.308	0.047*	42
Anxiety	-0.401	0.009*	42
Caffeine			
Hostility	0.435	0.004*	42
Physical Health	-0.284	0.089	37
Smoking			
Depression	0.310	0.034*	47
Anxiety	0.253	0.086	47
Hostility	0.279	0.057	47
Forgiveness			
Anxiety	0.254	0.088	46
Religious Support (Congregation Benefits)			
Depression	0.265	0.090	42
Anxiety	0.319	0.039*	42
Gain in Faith Age			
Anxiety	-0.398	0.040*	27
Physical Health	0.381	0.073	23
Loss in Faith Age			
Physical Health	0.989	0.011*	4
Organizational Religiousness			
Systolic BP	0.302	0.044*	45

Table 7. MANOVA results for categorical demographics and BMMRS scales with psychological distress and health status.

CATEGORICAL DEMOGRAPHICS	MANOVA	P-VALUE	SIG.
Gender	F(7,28) = 0.663	0.701	
Race[a]	F(14,56) = 0.547	0.893	
Education	F(35,140) = 0.913	0.612	
Marital Status	F(28,112) = 1.653	0.035	*
Employment	F(28,112) = 1.748	0.022	*
Cardiac Medication	F(14,56) = 0.997	0.469	
Type of Cardiac Diagnosis	F(28,112) = 1.148	0.300	
Multiple Cardiac Diagnoses	F(14,56) = 0.721	0.745	
CATEGORICAL RELIGIOUS/SPIRITUAL VARIABLES			
Age at Changed Experience	F(14,56) = 1.296	0.239	
Age at Gain in Faith	F(14,56) = 0.830	0.634	
Religious Preference[b]	F(21,84) = 0.598	0.909	

[a]Race divided into African American and Caucasian
[b]Religious Preference divided into Roman Catholic, Baptist, Protestant/Nondenominational Christian, and Other Religion

Table 8. Chi-square analyses between demographic and BMMRS variables.

VARIABLES	CHI-SQUARE	P-VALUE	SIG.
Gender x Race[a]	$X^2(2)=0.284$	0.867	
Gender x Religious Preference[b]	$X^2(4)=7.106$	0.130	
Race[a] x Religious Preference[b]	$X^2(8)=27.536$	0.001	*
Race[a] x Life-Changing Experience[c]	$X^2(4)=20.743$	<0.001	*
Race x Gain in Faith Experience[d]	$X^2(4)=25.613$	<0.001	*
Gender x Life-Changing Experience[c]	$X^2(2)=1.381$	0.501	
Gender x Gain in Faith Experience[d]	$X^2(2)=2.063$	0.357	

[a]Race divided into African American, Caucasian, and Other Race
[b]Religious Preference divided into Roman Catholic, Baptist, Protestant/Nondenominational Christian, Other Religion, and Unknown
[c]Life-Changing Experience divided into Yes, No, and Unknown
[d]Gain in Faith Experience divided into Yes, No, and Unknown

Table 9. Chi-square between religious preference and race.

			Religious Preference					
			Roman Catholic	Baptist	Other Religion	Protestant/ Other Christian	Unknown	Total
Race	Other Race	Count	0	0	0	2	4	6
		Expected Count	1.4	.9	.7	1.8	1.2	6.0
	African Am.	Count	1	7	2	8	4	22
		Expected Count	5.2	3.5	2.6	6.5	4.3	22.0
	Caucasian	Count	11	1	4	5	2	23
		Expected Count	5.4	3.6	2.7	6.8	4.5	23.0
Total		Count	12	8	6	15	10	51
		Expected Count	12.0	8.0	6.0	15.0	10.0	51.0

Table 10. Chi-square between religious/spiritual life-changing experience and race.

			Life-Changing Experience			
			No	Yes	Unknown	Total
Race	Other Race	Count	0	3	3	6
		Expected Count	2.2	3.3	.5	6.0
	African American	Count	7	15	0	22
		Expected Count	8.2	12.1	1.7	22.0
	Caucasian	Count	12	10	1	23
		Expected Count	8.6	12.6	1.8	23.0
Total		Count	19	28	4	51
		Expected Count	19.0	28.0	4.0	51.0

Table 11. Chi-square between gain in faith experience and race.

			Gain in Faith Experience			
			No	Yes	Unknown	Total
Race	Other Race	Count	0	2	4	6
		Expected Count	1.6	3.6	.7	6.0
	African American	Count	4	18	0	22
		Expected Count	6.0	13.4	2.6	22.0
	Caucasian	Count	10	11	2	23
		Expected Count	6.3	14.0	2.7	23.0
Total		Count	14	31	6	51
		Expected Count	14.0	31.0	6.0	51.0

Appendix B: Figures

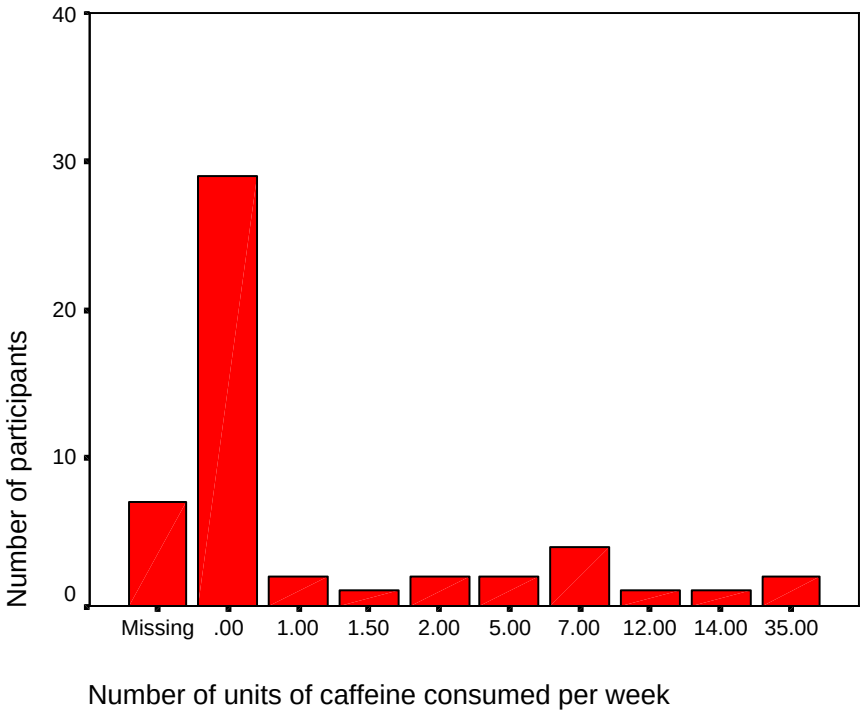

Figure 1. Distribution of caffeine consumption in sample.

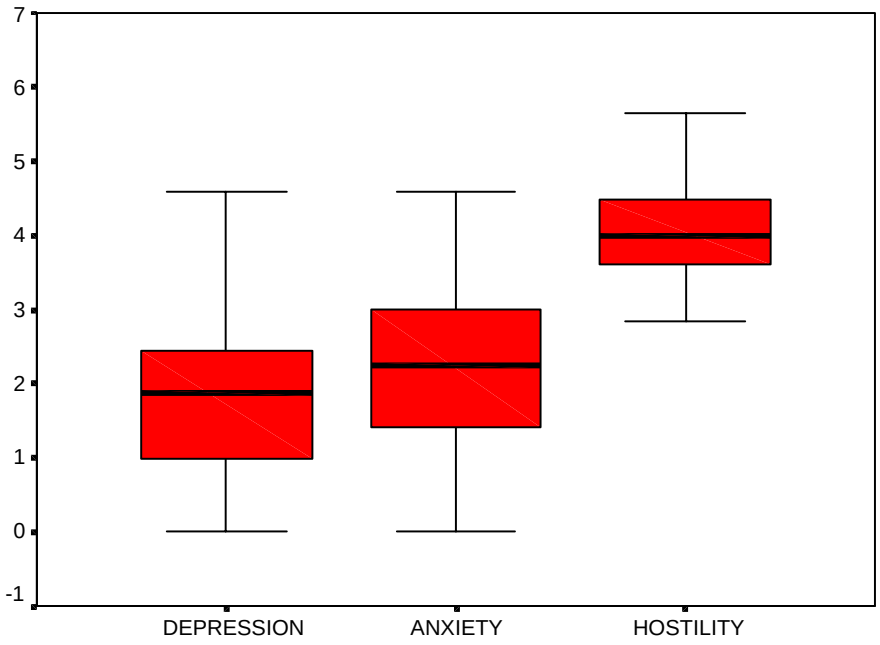

Figure 2. Distributions of transformed HADS scores and New-Buss hostility scores.

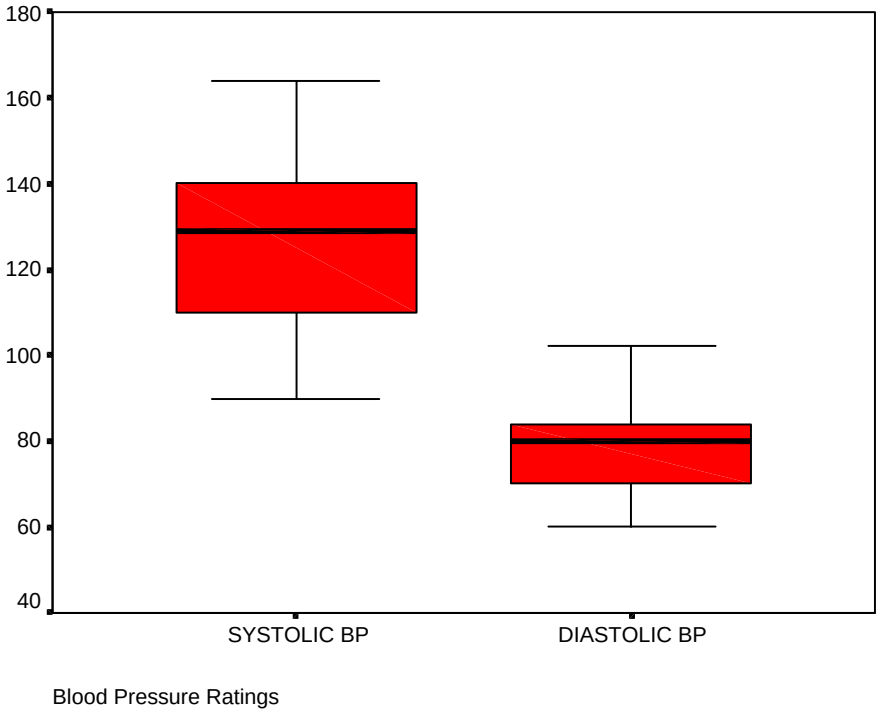

Figure 3. Distributions of blood pressure readings.

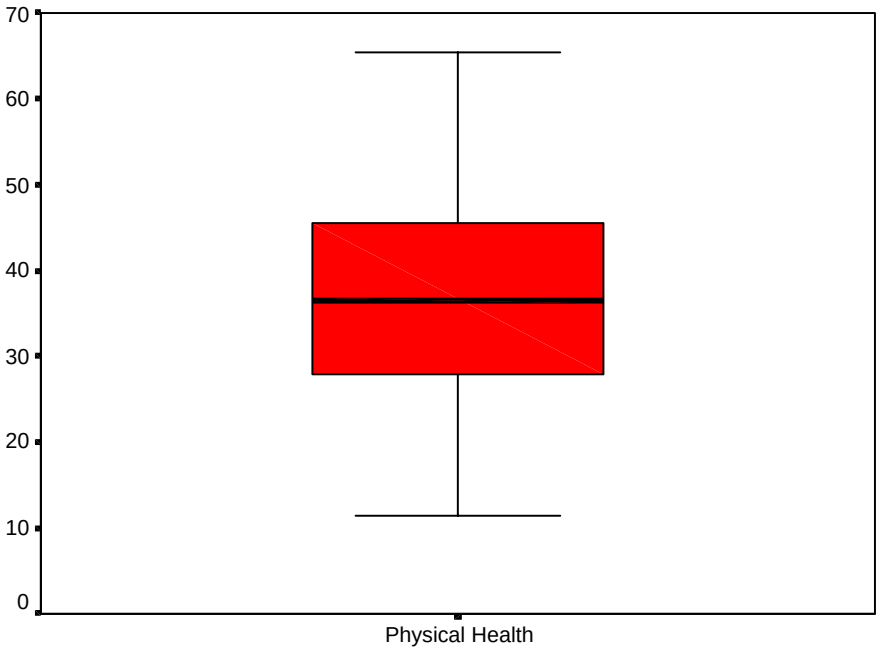

Figure 4. Distribution of SF-12v2 PCS scores.

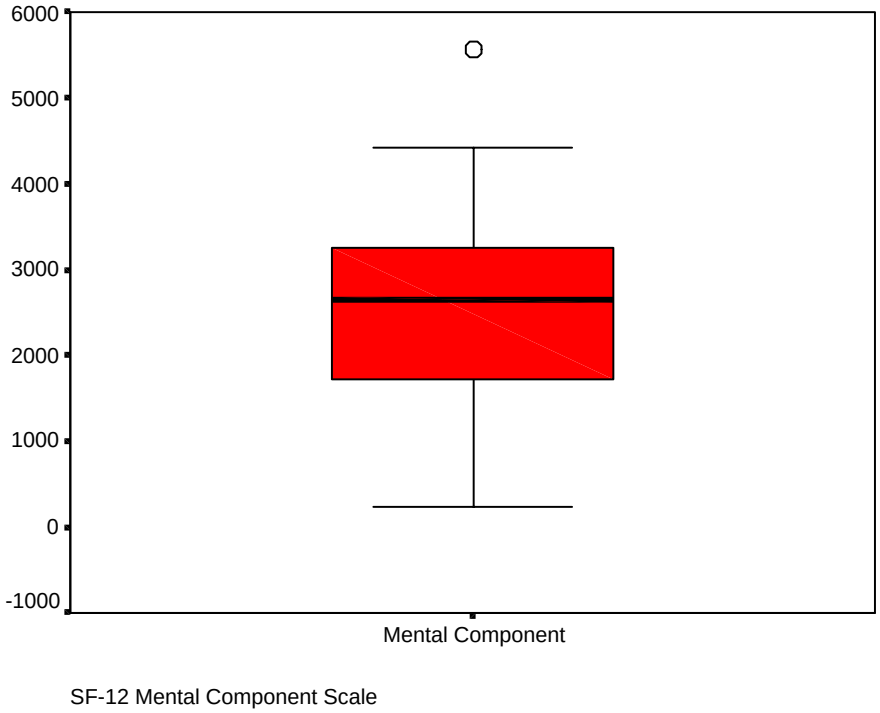

Figure 5. Distribution of transformed SF-12v2 MCS scores.

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