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ACCEPTANCE

This dissertation, THE RELATIONSHIP BETWEEN RELIGIOSITY AND RELIGIOUS COPING TO STRESS REACTI VITY AND PSYCHOLOGICAL WELL-BEING, by ANDREW WARD, was prepared under the direction of the candidate's Dissertation Advisory Committee. It is accepted by the committee members in partial fulfillment of the requirements for the degree Doctor of Philosophy in the College of Education, Georgia State University.

The Dissertation Advisory Committee and the student's Department Chair, as representatives of the faculty, certify that this dissertation has met all standards of excellence and scholarship as determined by the faculty. The Dean of the College of Education concurs.

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ABSTRACT

THE RELATIONSHIP BETWEEN RELIGIOSITY AND RELIGIOUS COPING TO STRESS REACTIVITY AND PSYCHOLOGICAL WELL-BEING

by

Andrew M. Ward

A significant body of research has identified the deleterious effects of stress on psychological well-being (e.g., Tataro, Luecken, & Gunn, 2004). Religiosity and religious coping have been identified as variables that may impact a person's experience with stress (Ano & Vasconcelles, 2005). Aukst-Margetic and Margetic (2005) suggest that the connection between stress, religious variables, and well-being can be understood through the frame of psychoimmunodocrinological research, which examines the relationship between neurohormonal functioning (e.g., cortisol level) with psychological factors that may impact health. The purpose of this study was to investigate whether acute stress reactivity, as measured by changes in cortisol levels in response to a laboratory stressor, is related to religiosity, religious coping, and psychological well-being such as depression and anxiety. Another purpose of this study was to attempt to replicate and extend Tataro, Luecken, & Gunn (2005), which found evidence that higher religiosity and composite religiosity/spirituality was associated with lower cortisol level after exposure to acute stress. Results indicated that cortisol level was not significantly related to gender, self-rated religiousness, spirituality, frequency of prayer, or forgiveness. In addition, cortisol reactivity was not significantly related to measures of psychological well-being, although negative religious coping significantly predicted depression, and state and trait forms of anxiety. Limitations, practical implications, as well suggestions for future research are discussed.

# THE RELATIONSHIP BETWEEN RELIGIOSITY AND RELIGIOUS COPING TO STRESS REACTIVITY AND PSYCHOLOGICAL WELL-BEING

by
Andrew M. Ward

A Dissertation

Presented in Partial Fulfillment of Requirements for the
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Doctor of Philosophy
in
Counseling Psychology
in
the Department of Counseling and Psychological Services
in
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## ABBREVIATIONS

| | |
|---|---|
| STAI | State-Trait Anxiety Inventory |
| CES-D | Center for Epidemiological Studies-Depression Scale |
| BMMRS | The Brief Multidimensional Measure of Religiousness/Spirituality |
| B-RCOPE | The Brief Religious Coping Scale |
| I/E-R | The Age-Universal Intrinsic/Extrinsic-Revised Scale |

# CHAPTER 1

# RELIGION AND HEALTH: A REVIEW OF THE LITERATURE AND IMPLICATIONS FOR FUTURE EXPLANATORY MODEL RESEARCH

Religious beliefs and practices have been present in nearly all cultures since recorded history. According to some estimates, 86% of the world's population identifies an affiliation with some sort of religious or spiritual system (Barrett, Kurian, & Johnson, 2001). In the United States alone, approximately 82% of adults express belief in God (Harris Interactive Poll, 2005), 58% pray daily, 44% attend religious services at least twice a month, and 56% identify religion as a very important influence in their lives (Pew Research Center, 2008).

Despite the prevalence of religious-oriented individuals and the reported impact of religion in the lives of adherents, the study of religion and its relation to adjustment and well-being accounts for a very small percentage of the psychology literature (Ano & Vasconcelles, 2005). This might be attributed to the fact that the study of religion can be complex to study. Religions come in many 'shapes and sizes' and these differences have tremendous impact on values, morals, behavior, emotion, cognition, and culture thus making a systematic approach to research challenging. Furthermore, one of the most basic problems when investigating the impact of religion is the countless definitions of religion, as well as inclusion/exclusion criteria to differentiate between religious groups. For example, researchers as well as practitioners of faith cannot come to a consensus regarding the difference between "religion" and "spirituality" (Miller & Thoresen, 2003).

This has affected issues related to theoretical conceptualization and empirical measurement and has likely accounted for fragmented and inconsistent findings in the psychology literature (Levin & Chatters, 1998).

In spite of these issues, interest in the links between religion and mental and physical health has increased sharply over the past two decades (McCullough, Larson, Koenig, & Lerner, 1999). Researchers continue to explore which aspects of religious involvement and beliefs influence well-being, and which mechanisms and/or models may account for these observed relationships (Ellison, Boardman, Williams, & Jackson, 2001). This paper will review the existing literature on religion's association with key indicators of physical and psychological well-being, explore theorized explanatory models, and discuss directions for research in the area of psychoimmunodocrinology as a possible mediating or moderating factor in the relationship between religious faith and health.

## The Religion - Health Connection

### *Early Research Linking Health and Religion*

Koenig and Larson (2001) note that while there were a few notable early psychologists who highlighted religion's benefits throughout the years such as William James and Carl Jung, a vast number of psychologists argued against religious faith's benefits. Freud is one of the first psychologists who framed religion in pathological terms. For example, according to Freud, religion was neither helpful nor functional and he viewed it as "the universal obsessional neurosis of humanity" (Freud, 1959). Several decades later these ideas continued with several of the field's most prominent scholars. For example, Albert Ellis held similar beliefs to Freud in that he regarded religious

persons as less psychologically healthy than non-religious individuals (Ellis, 1988). Much of the research of the 1950's and 1960's seemed to confirm the opinions of Freud, Ellis, and others (Koenig & Larson, 2001). For example, Dreger (1952) reported that religious college students were more conforming, dependent, and ego defensive than non-religious students. Similarly, Rokeach (1960) and Dunn (1965) found that religious persons consistently evidenced poorer indicators of emotional, psychological, and somatic health as compared to non-religious populations. In addition, Sanua (1969) reviewed a significant body of published literature and concluded that the empirical data did not support the hypothesis that religion was associated with salutary mental health effects.

However, as several authors point out (e.g., Flannelly, Ellison, & Strock, 2004; George, Ellison, & Larson, 2002), most of the research of this time involved convenience samples or included psychiatric patients rather than samples of mature, mentally stable adults. Additionally, various reviews and critiques of this body of literature have noted that a high percentage of early studies that examined the relation between religion and health often used simple or single item measures of religion rather than valid and psychometrically sound instrumentation (Flanelly, Flanelly, & Weaver, 2002; Orr & Issac, 1992). Another critique of the early literature is that religion was viewed as a unidimensional construct. Only recently has religion been conceptualized as multidimensional with subsequently developed reliable and valid scales to adequately capture its complexity. Another issue relevant to early studies in this area relates to sampling. According to a review by George et al. (2002), a high percentage of studies more than twenty years old (nearly 50% of published literature) are based upon samples

of older adults (i.e., 60-65 and older). While this can be advantageous in that it captures the risks and prevalence of mental and physical illness within this cohort, the generalizability of the research is limited. George et al. (2002) further suggest that a common flaw in early studies was a lack of statistical control for covariates in their research design thus contributing to a likely higher prevalence of inconsistent results and possible spurious interpretations of data.

While these issues have not been completely addressed in contemporary studies, vast improvements have been made in recent years resulting in a growing and robust, albeit non-conclusive, body of evidence that suggests religious involvement is associated with better physical and mental health and longer survival. Evidence of religious involvement's association with positive outcomes has been replicated in persons across ages, races, and socioeconomic strata and cross religious lines beyond a Judeo-Christian perspective, which tends to dominate much of the literature (Gartner, Larson, & Allen, 1991; Koenig & Larson, 2001)

Although this body of research is broadly reviewed for the purposes of this paper, several issues merit attention. First, studies of spirituality are not included because the concept is broader and much harder to define and measure (Aukst-Margetic & Margetic, 2005). Moreover, studies of spirituality and health outcomes are fewer in number (Plante & Sherman, 2001). Second, studies included are those that have used the most common operationalized independent variables such as religious orientation (e.g., intrinsic versus extrinsic), religious coping, and dispositional factors such as attendance at religious services and related activities (e.g., religious study groups), religious affiliation (major religions or specific denominations), and private religious practices (e.g., prayer,

meditation, reading religious materials etc.). Third, for ease of review, given the perceived size and scope of this literature, results are delineated by health-related dependent or outcome variables.

*Depression*

Depression is one of the most commonly studied outcome variables when examining the relationship between religious faith and mental health. To date, previous investigations have observed a consistent association between religious faith and depressive symptoms, with the majority of data pointing towards an inverse relationship (Koenig, 2001b). Gartner et al. (1991) conducted one of the first systematic reviews on this topic. In their review of sixteen published cross-sectional studies, the authors concluded that the data supported the hypothesis that those with higher religious commitment had a decreased risk for depression and suicide. Additionally, in a meta-analysis of 147 independent studies by Smith, McCullough, and Poll (2003), the correlation between overall religiousness and depressive symptoms was -.096, indicating that greater religiousness was inversely associated with fewer symptoms of depression, although the authors noted that the relationship was weak. Of note, the results were not moderated by gender, age, or ethnicity, although the depression-religiousness association was stronger in studies involving people who were undergoing stress due to recent life events.

Koenig (2001b) conducted one of the most popular and frequently cited reviews of religion's impact on health and depression. While his review examined the literature using only descriptive statistics, he identified 101 studies that investigated the relationship between religious involvement and depression, including 8 clinical trials and

22 prospective cohort studies, as well as 68 studies that examined the relationship between suicide rates and levels of religious involvement and beliefs. Koenig concluded from his review that those identified as more religious had lower rates of depression and suicide.

Investigations into religious orientation and its association with depression provide additional clarity in understanding the relationship between religion and health. Several studies have shown that intrinsic religiosity (being wholly committed and motivated by one's religious beliefs) is negatively associated with depressive symptoms. For example, Braam, Beekman, Deeg, Smith, and Van Tilburg (1997) found that those individuals who identified religion as one of the most important influences in their lives had a significantly lower chance of becoming depressed compared to those who did not identify as having religious faith. Additionally, in a study by Koenig, George, and Peterson (1998), the authors reported that among clinically depressed adults, intrinsic religiousness (i.e., the private meaning and purpose obtained from religious beliefs that are evident in nearly all areas of life) was strongly associated with the speed with which individuals' depressive symptoms subsided, even after controlling for a variety of potential confounds. In a longitudinal study by Park, Cohen, and Herb (1990), the authors found evidence that greater intrinsic religiosity predicted less depression over time and buffered the negative effects of life stress, specifically stress that was identified as uncontrollable.

Previous research also suggests that extrinsic religiosity (using religion as a means to achieve power, status, or influence) is positively related to depression. For example, Koenig, Larson, and McCullough (2001) reported in their review of the

literature that the correlations between extrinsic religiosity and depressive symptoms have typically been in the $r = .03$ to $r = .25$ range, with a central tendency range around $r = .15$.

Systematic studies of religious coping (i.e., how individuals use religious beliefs when under stress) have also shown links to depression. Pargament, Smith, Koenig, and Perez (1998) proposed that religious coping is best understood as a two-factor model in response to stressful events, positive religious coping (e.g., forgiveness, collaborative problem-solving with God, religious purification, benevolent religious reappraisals, spiritual connection with others etc.) and negative religious coping (punitive religious appraisals, demonic reappraisals, spiritual discontent, self-directing coping efforts etc.). This delineation has shown promise in understanding how religious faith could be associated with negative health outcomes. For instance, Ano and Vaconcelles (2005) conducted a meta-analysis of 49 studies of religious coping and found that positive forms of religious coping were related to lower levels of depression, anxiety, and distress, while negative forms of religious coping were associated with poorer psychological adjustment particularly depressive symptoms.

A few recent studies have noted that the strictness of beliefs associated with a given religious affiliation may moderate the relationship between religious faith and depression. For example, Sorenson, Grindstaff, and Turner (1995) studied the relationship between depressive symptoms, religious affiliation and attendance, and social support. Results suggested that those with the highest levels of depression were from the most conservative religious groups and who attended religious services more frequently. The authors concluded that, in some instances, religion may actually foster

feelings of guilt, shame, and hopelessness, particularly for those who do not conform to social and religious norms prescribed by religious bodies.

Interestingly, there is some evidence that the type of stress experienced may also be a moderating variable when considering the association between religious faith and depression and overall distress. For instance, Strawbridge, Shema, Cohen, Roberts, and Kaplan (1998) assessed organizational and non-organizational religious involvement in nearly 2,500 subjects to examine whether religious involvement moderated the relationship between stressful life events and depression. The researchers found that religious involvement (both organizational and non-organizational) buffered the effects of financial and health stressors resulting in less reported depression. On the other hand, religiosity was associated with greater levels of depression and distress when individuals were faced with family problems. The authors hypothesized that religious resources may be more helpful for problems originating outside the home (e.g., financial or health problems) but can actually worsen matters that might be deemed as personal failures (marital, child, or other relative problems) by others.

*Anxiety*

Similar to depression-related studies, religious faith is consistently inversely associated with anxiety symptoms; however, most of the research in this area is cross-sectional in nature, which limits the ability to identify causative and dynamic factors that address the complexity of observed relationships (Koenig et al., 2001). Previous research has focused primarily on the relationship between dispositional factors such as overall religious commitment and religious service attendance and anxiety symptoms. For example Harris et al. (1995) examined the relationship between frequency of church

attendance and reported anxiety symptoms for heart transplant recipients. The results indicated that frequent church attenders reported less anxiety and had higher self-esteem than non-frequent attenders through their first year after transplantation. Koenig, Ford, George, Blazer, and Meador (1993) examined the relationship between anxiety disorders and religious involvement across different age ranges. Results indicated that rates of anxiety were lower among frequent church attenders and mainline Protestants as compared to Catholics, Pentecostals, or non-religious individuals. Interestingly, young adults (18-39) reported greater anxiety symptoms, particularly those who endorsed no religious affiliation or who affiliated with fundamentalist or Pentecostal groups.

Studies of intrinsic and extrinsic religiousness help to provide clarity regarding how religious faith is associated with anxiety. Previous studies have consistently found a negative correlation between intrinsic religiosity and anxiety and a positive correlation between extrinsic religiosity and anxiety which may help to explain some of the mixed findings in the religion-anxiety literature. For example, Baker and Gorsuch (1982) found that trait anxiety was negatively correlated with intrinsic religiosity and positively correlated with extrinsic religiosity scores. The authors also found evidence that paranoia and poor social integration correlated significantly with extrinsic religiosity but negatively with intrinsic religiosity. In a more recent critical review of 17 studies by Shreve-Neiger and Edelstein (2004), the authors found that both religious attendance and intrinsic (internalized) religiosity were positively associated with reduced anxiety, while extrinsic (utilitarian) religiosity was inversely associated with anxiety. A meta-analysis by Ano and Vasconcelles (2005) showed an association between positive forms of

religious coping and lower overall levels of anxiety, while negative religious coping methods were associated with increased anxiety symptoms.

Research conducted in different cultures and major religious affiliations provide similar results. For example, Tapananya, Nicki, & Jarusawad (1997) conducted a study that examined the association between intrinsic religiousness and worry in a sample of elderly Buddhists from Thailand and elderly Christians in Canada. Results indicated an inverse relationship between intrinsic religiosity and worry for both Christian and Buddhists respectively. Interestingly, Buddhists who were more extrinsic in their orientation to faith were prone to greater levels of worry than Christians with similar levels of extrinsic religiosity.

Other studies have found that religious beliefs that are incompatible have been associated with poorer indicators of mental health, particularly anxiety. For example, Trenholm, Trent, and Compton (1998) assessed state and trait anxiety symptoms along with religious conflict (religious-based anxiety in relation to behavior that is incompatible with religious teachings) in a sample of sixty women. Results indicated that higher negative religious conflict was positively associated with level of anxiety. The authors further noted that feelings of religious guilt and the failure to meet religious expectations likely contribute to higher levels of overall anxiety and may evoke open criticism by other congregation members or clergy, and thus perpetuate further anxiety.

*Substance Use and Addiction*

Substance addiction and use-related problems can have a significant cost on the societal as well as individual level in the areas of physical disease and mental distress. According to Koenig et al. (2001), religious beliefs and practices may be a protective

factor against serious alcohol and drug problems and in the rehabilitation of users. A review by Williams and Sternthal (2007) examined religion's influence on adolescent substance use, particularly in Australian students. The authors concluded that the body of literature in this area supports the premise that religiosity is inversely related to a broad range of risk behaviors, most notably higher substance use. While the generalizablity of this review is limited due to its focus on Australian society, other studies report similar results. For example, in several cross-sectional studies conducted in the U.S., religiosity was negatively correlated with alcohol use, marijuana use, and other hard drug usage (e.g., Hays, Stacy, Widaman, DiMatteo & Downey, 1986; Matthews et al., 1998; Zucker, Austin, Fair, & Branchey, 1987). An older but often cited literature review by Gorsuch and Butler (1976) attempted to identify social and psychological factors that may predispose individuals to drug use and ultimately addiction. The authors found that when a study included religious variables in their methodology, religious commitment in particular predicted who used and who abstained from illicit drug use. The authors also concluded that nurturing and supportive religious experiences were associated with decreased substance use, whereas religiosity characterized as harsh, restrictive, and punitive was associated with increased risk for addiction. Gartner et al. (1991) came to similar conclusions fifteen years later when they reviewed 12 published correlational studies investigating the association between religious variables and drug and alcohol use. The researchers concluded that religious commitment was inversely associated with addictive behavior and overall risk for developing substance use problems.

*Mortality*

A search of published literature yielded approximately 100 studies that have examined the relationship between religion and mortality. Results of these studies consistently show a relationship between religiosity and decreased mortality, with religious attendance as the most commonly used religion variable. Much of the data points to an inverse relationship between religious faith and mortality, although, a greater relationship exists between measures of public religious involvement (i.e., religious attendance) and mortality as opposed to measures of private religiousness (e.g., self-rated religiousness, frequency of private prayer etc.) (Aukst-Margetic & Margetic, 2005). For example, an 8-year longitudinal study of 21,000 adults in the U.S. resulted in a strong inverse association between religious attendance and mortality. Specifically, life expectancy for individuals at age 20 who attended religious services regularly was, on average, seven and a half years longer than those who never or rarely attended. This effect proved to be even stronger for African Americans, who showed nearly double the average for Caucasian subjects (13.7 years) in additional life expectancy (Hummer, Rogers, Nam, & Ellison, 1999). A meta-analysis by McCullough, Hoyt, Larson, Koenig, and Thoresen (2000) of 42 independent studies, representing 125,826 adults and 15 potentially influencing controlled factors, found that weekly or greater religious service attendance yielded 29% fewer deaths than did nonattendance.

Another rigorous review by Powell, Shahabi, & Thoreson (2003) examined the association between religion, health, and life expectancy. The authors concluded that a strong, consistent reduction in mortality rates is present in religious populations who specifically engage in regular religious attendance. The authors further stated that the reduction in mortality was approximately 25% when other confounding factors were

controlled. Koenig (2001d) also reviewed 52 published cross-sectional studies investigating the religion-morality association and found evidence of longer survival for those who reported greater religiousness.

Not all studies have found evidence of an inverse relationship between increased religiousness and mortality. Perhaps the most prominent and highly referenced study by critics of this literature is Janoff-Bulman and Marshall, 1982. In this study, religious commitment was associated with shorter survival as opposed to an increase in mortality. This study also attempted to identify psychosocial predictors of mortality including perceived control, well-being, purpose in life, demographic variables, and expressed importance of religious beliefs. Matthews et al. (1998) commented, however, that this study had several methodological flaws most notably a small sample size (n=25) and 18 inferential tests evaluated at $P < .05$ which may have inflated the probability of a Type I error. Nonetheless, Matthew et al.'s review points out that any relationship between religion and mortality is unlikely to be straightforward and our understanding of its complexities remains limited.

Additionally, one of the most common ways that religion can negatively influence mortality rates is though the restriction of appropriate medical care. A growing body of literature has begun to investigate the effect of religiously-motivated neglect of medical care in the areas of surgery, pharmacotherapy, blood transfusions, childhood immunizations, and pre-natal care. While the prevalence of how often religious individuals eschew medical care remains uncertain (Koenig et al., 2001), it is clear from several clinical studies (e.g., Kaunitz, Spence, Danielson, Rochat, & Grimes, 1984; George et al., 2002; Simpson, 1989; Wilson, 1965) that such practices significantly

increase the rates of mortality for both children and adults. A review by McCullough et al. (1999) found that the majority of studies that report a positive association between religion and increased mortality occur in the most rigid and conservative forms of religion, particularly Christianity. However, the authors also suggest that one must utilize care when generalizing such results, considering that most religious sects, denominations, and affiliations do not advocate such teachings.

*Cardiovascular Illness*

In addition to mental health, religious faith and commitment is associated with a lower prevalence of physical illness, specifically chronic illness (Matthew et al., 1998). One of the most common health outcomes studied in the literature is in the area of cardiovascular related illness. In a study by Steffen, Hinderliter, Blumenthal, and Sherwood (2001), researchers investigated the relationship between religious coping, ethnicity, and ambulatory blood pressure. Their methodology included sample collection at multiple intervals throughout the day and during sleeping hours. The results indicated a strong inverse association between religious coping efforts and lower ambulatory blood pressure even after controlling for demographic variables. This effect was most pronounced among African Americans. The authors hypothesized, based upon their results, that religiosity may be a pathway that moderates the relationship between lower 24-hour blood pressure and cardiovascular health. Similarly, in Larson et al. (1989), researchers examined hypertension and religiosity by comparing the blood pressure of religious smokers to non-religious smokers and non-smokers. Smokers identified as ‘religious,’ and having religious beliefs that were important to them, were approximately seven times less likely to have abnormal diastolic blood pressure as compared to smokers

who did not view religion as personally important. Furthermore, smokers who attended religious services at least once a week were four times less likely to have abnormal diastolic pressure than non-religious smokers or smokers who attended religious services infrequently. The authors concluded that religious beliefs and commitment might positively impact health even among people who engage in higher risk behaviors such as smoking.

*Cancer*

Cancer is another commonly studied illness in relation to religious beliefs, although the data to date in this area appears to be more relevant to specific and relatively insular religious groups. For instance, a consistent finding in the literature suggests that Seventh-Day Adventists and Mormons in particular experience lower rates of cancer than the general population (Koenig, 2001d). One of the first studies investigating this trend was by Lyon, Gardner, and West (1980). Their review of nearly 20,300 cases of cancer in Utah showed a significant difference in incidence rate between Mormon and non-Mormon populations. Specifically, cancers of the lung, larynx, oral cavity, esophagus, and urinary bladder showed an incidence rate in Mormons at about one-half that of non-Mormons. Rates of cancers of the breast, cervix, and ovary were significantly lower in Mormon women as well; the rate for cervical cancer was about one-half that observed in non-Mormons. Finally, cancers of the stomach, colon-rectum, and pancreas were about one-third lower among Mormons than non-Mormons.

Two years later, Lyons and Gardner (1982) in a related study found similar outcomes. In this study, the researchers examined malignant breast cancer and prevalence rates of colon-rectum cancer, cervix cancers, leukemias, and lymphomas

among Mormon women exclusively. Moreover, the researchers investigated level of religiosity and church activity as potential moderators. Results showed that Mormon women with the strongest adherence to church doctrines had statistically significant lower lung cancer rates as compared to women with the weakest adherence; however, other forms of cancer between the two groups such as uterine, cervix, breast, ovary, and gastrointestinal were statistically non-significant, causing the authors to hypothesize that adherence to specific church doctrines may not adequately explain differences in cancer rates. More than a decade later, Lyon, Gardner, and Gress (1994) conducted another study examining cancer rates in a sample of over 49,000 cases. Similar to previous studies, for all causes of cancer, the rate for both male and female Mormons was approximately 24 percent less than comparable U.S. rates.

Although the association between religion and cancer risk is most robust in Mormon and generally stricter approaches to faith (Levin, 1994), similar outcomes have resulted in studies examining other religious populations. For instance, in Koenig's (2001d) review of three studies examining rates of cervical cancer among religious but non-Mormon populations, two studies reported lower rates of cancer in individuals with greater levels of religiosity. One study (i.e., Reynolds & Kaplan, 1990) found no association between religiousness and overall cancer risk. In a population-based case control study of Blacks and Whites in North Carolina from 1996 to 2000, researchers Kinney et al.(2003) found that infrequent religious attendance (less than once per month) was positively associated with advanced stage of colon cancer in Whites but not in Blacks. The authors suggest cultural differences may influence religion's impact on both

risk and prognostic indicators of colon cancer, although they also concede that several uncontrolled confounds may have influenced results.

*Immune Functioning*

Although the study of religion and its affect on immune function is in its formative stages, it is worth noting the preliminary evidence that has begun to accumulate. A search of the literature yielded less than ten published studies investigating this relationship. McClelland conducted the first study published in 1988 (McClelland, 1988). In this study, two groups of students watched a religious film or a secular film based upon group assignment while the researchers monitored levels of salivary immunoglobulin (S-IgA), a subclass of protein produced in lymph tissue that function as antibodies in the immune response. Results indicated that students who watched the religious film had statistically higher levels of salivary IgA. In Koenig et al. (1997) the researchers more explicitly and directly evaluated religious involvement with immune functioning. In their design, 1718 subjects age sixty-five years or older had blood drawn for analysis of immune regulators and inflammatory factors, most notably interleukin-6, a secretion by T cells and macrophages that acts as both a pro-inflammatory and anti-inflammatory based upon immune system need. Subjects also provided information about their level of religious involvement. Results showed an inverse relationship between religious attendance and interleukin-6 levels. Further analyses revealed that high religious attendance predicted a lower proportion of subjects with high interleukin-6 levels. Additionally, a significant relationship resulted between religious attendance and lower levels of other immune-inflammatory markers such alpha-2 globulin, polymorphonuclear leukocytes, and lymphocytes. The authors added that

while controlling for covariates such as depression or negative life events weakened the association, the results remained statistically significant and provided support for the hypothesis that older adults who frequently attend religious services have healthier immune systems.

Lastly, in two other studies (i.e., Sephton, Koopman, Schaal, Thoreson, & Spiegal, 2001; Woods, Antoni, Ironson, & Kling, 1999) religious variables, operationalized as frequency of prayer, religious attendance, religious coping, and reading religious/spiritual literature, were all associated with significantly higher T-helper cells. In the Woods et al., 1999 study, further analysis found significant positive correlations between religious expression and Natural Killer (NK) cells and total lymphocytes. Critiques of this emerging research such as Seeman, Dubin, and Seeman (2003) note that while the initial data are intriguing, the overall hypothesis that greater religiousness is associated with better immune functioning remains unclear primarily because several of the available studies are cross-sectional in nature and restricted to population subgroups.

*Overall Physical Illness*

Levin and Schiller (1987) reviewed over 200 studies examining the relationship between religious commitment and physical health problems including cardiovascular disease, hypertension, and stroke. The authors concluded that, religion, however operationalized, appears to exert a positive effect on health regardless of the outcomes or diseases that are examined. Interestingly, Levin and Schiller also noted two distinct trends in the data. First, when comparing different religious groups, adherents of more behaviorally strict and authoritarian forms of religion appear to be at comparatively lower

risk of disease or illness. Second, the authors found evidence consistent with the literature linking health to mental health outcomes that there was a direct and positive association between greater religiosity and better overall health status. This relationship persisted across major religious faiths and approaches from Catholics, Protestants, Jews, Mormons, and Zen Buddhists regardless of how religiosity was operationalized; however, religious attendance had the strongest positive association with overall health status. Other reviews have found similar results. In a review by Levin and Vanderpool (1987), the authors examined twenty-seven published cross-sectional studies that investigated the relationship between religious service attendance and overall physical health. The researchers concluded that religious service attendance (church, synagogue, or mosque) was positively associated with overall health status.

While there is growing evidence that supports the relationship between religious faith and greater physical health outcomes, these associations are complicated by a possible confound: healthy persons might be more likely than the unhealthy to attend public religious activities (Pullen, Modrcin-Talbot, West, & Muenchen, 1999) suggesting religious attendance may simply be a proxy for functional ability (Matthew et al., 1998). In addition, the relationship between frequency of religious attendance and physical health status remains poorly understood due to the fact that a high percentage of studies to date have relied upon cross-sectional methodologies as opposed to clinical trials or prospective studies (Williams & Sternthal, 2007). While other research designs such as prospective cohort studies, longitudinal studies, and clinical trials continue to grow in this area, these associations should not be viewed as straightforward. Additional research is needed to help clarify the data, particularly among within-group differences (i.e.,

comparing different denominations or different cultures sharing the same religious beliefs; Flanelly et al., 2004).

*Coping with Illness*

A subset of the religion-health literature has specifically examined the role religion plays in helping one cope with physical or mental illness once it occurs. As Matthews et al. (1998) noted, religious commitment seems to become especially important once an illness, particularly one that is life threatening, is diagnosed in a person. For example, in a study examining health locus of control, Saudia, Kinney, Brown, and Young-Ward (1991) examined one-hundred hospitalized patients about to undergo cardiac surgery in an attempt to identify important coping resources related with the stress of impending surgery. The researchers found that 96% of the patients used prayer as a coping mechanism in dealing with their stress. When asked how helpful they found prayer to be, 70% of these patients indicated it was "extremely helpful" in assisting coping efforts. In Oxman, Freeman, and Manheimer (1995), the researchers examined the relationship of social support and religion to mortality and coping after open-heart surgery in 232 hospitalized patients. Results suggested that the strength and comfort derived from religious beliefs was the most powerful predictor of recovery and survival as compared to other variables such as psychosocial characteristics, personality traits, and mood states.

In terms of mental illness, results are similar in nature. For instance, in Koenig et al. (1992) the researchers found that using one's religious beliefs as a coping resource was associated with a reduced likelihood of developing depression in those suffering from physical illness. Furthermore, the researchers found that the link between religious

coping efforts and depression persisted even after controlling for other predictors of depression such as social support, age, and history of psychiatric problems. In a study conducted by Williams, Larson, Buckler, Heckmann, and Pyle (1991), the authors examined the effect of religious attendance and affiliation on psychological distress in a longitudinal community study of 720 adults. Results showed that, in the face of stressful events and physical health problems, religious attendance reduced the adverse consequences of stressors directly tied to psychological well-being, even when other predictive variables such as age, education, and marital status were controlled. Specifically, as frequency of religious attendance increased, the adverse effects of stress were buffered.

## How and Why Does Religion Benefit Health

### *Health Practices*

Given the accumulating evidence that religious involvement can be beneficial to health, a critical next step is to identify the pathways or mechanisms by which religion exerts its salutary effects (George et al., 2002). One of the most theorized mechanisms is through health-focused behavior and lifestyle practices. This perspective suggests that religious participation may lead to better health outcomes by limiting potentially negative risk-related behaviors (e.g., alcohol, tobacco, and illicit drug use, risky sexual practices) while promoting positive health-related behaviors such as proper diet and sleep patterns, sexual fidelity etc. This view also suggests that religious involvement may encourage moderation in other forms of risk-taking behavior such as gambling, fighting etc. Although the motivation for such practices are not always altruistic and in such cases may negate some of the benefits psychologically (i.e., threat of social sanctions from

other religious members, need for approval, fear of divine punishment etc.), the effects of religiously driven health behaviors are a consistent and robust predictor of mental and physical well-being in the literature. For example, Williams and Sternthal (2007) comment that lower risk of disease and rate of mortality found in studies of conservative religious groups such as Mormons and Seventh-Day Adventists are likely the result of religiously sanctioned teachings related to the prohibition of alcohol, vegetarian diets, and the consumption limit of meat and dairy products. Similarly, George et al.'s (2002) review highlights that health practices explain a substantial portion of the variance in studies where explicit religious proscriptions about health behaviors are compared to members of other religions, persons who are not affiliated with religion, or both. The authors go on to say that the research evidence suggests that health behaviors may in fact mediate the relationship between religious affiliation and specific health outcomes. Consistent with this line of argument, Ellison et al's (2001) review found evidence that the salutary effects of religious variables on mental health outcomes are likely reduced or eliminated when health-related practices are statistically controlled.

*Social Support*

A second explanatory mechanism often identified in the relationship of religiosity to health is the social support garnered from involvement in a religious community. Several studies have found evidence to support the hypothesis that social support mediates the relationship between religious involvement and health and well-being outcomes (e.g., House, Landis, & Umberson, 1988; Idler, 1987; Jarvis & Northcott, 1987; Levin, 1994; Pescosolido & Geogianna, 1989). Such studies have noted that religious social support is effective in that religious congregations provide a setting in which like-

minded individuals, who tend to share core beliefs, values, interests, and activities, meet on a regular basis and interact. In the few studies in which social support failed to mediate the relationship between religion and health (e.g., Musick, Koenig, Hays, & Cohen, 1998; Ellison, Musick, Levin, Taylor, & Chatters, 1997), social support was still statistically related to health outcomes. Similarly, in George et al.'s (2002) review, every study in which social support did not mediate the relationship between religion and health was still a statistically significant predictor of health outcome (mortality, depression, physical health, disability).

Religious social support is hypothesized to be effective because it provides a high degree of emotional care (e.g., companionship, prayer support), can provide a context for increased social interaction, and in many instances conducts education and health programs designed to foster health. Informally, fellow religious members can provide assistance through household chores, transportation, basic healthcare, meal preparation, and even financial support for those in crises or in life transitions (Jarvis & Northcott, 1987). Ellison and George (1994) reported that frequent religious participation was not only related to an increased number of social ties and interactions compared to non-religious individuals, but also to greater positive evaluations of those ties. McCullough et al. (2000) note that because religious social support is by definition experienced within the context of relationships with others, this is likely why measures of public religiousness (i.e., religious attendance, perceived religious social support) are more strongly related to health outcomes than private forms of religiousness (e.g., frequency of prayer, self-rated religiosity) in the literature.

Some evidence suggests that religious social support appears to be unique and additive in its role upon health and well-being. Ellison et al. (1997) offered evidence for this hypothesis when they compared the effects of secular and religious support as mediators in the relationship between religious attendance and psychological distress. Their results showed that secular social support was related to lower levels of distress for the entire sample, although it did not mediate the relationship between religious attendance and psychological distress. Among religious individuals, however, religious support also was associated with less distress and fully mediated the relationship between religious attendance and distress. Thus, it may be that social support obtained within a religious context may represent a unique pathway to positive health outcomes and may not be best understood as merely secular social support in a religious context.

*Meaning*

Previous authors have posited that meaning derived from religious beliefs and practices is an important mechanism that can help explain religion's association with improved coping and greater mental health outcomes. This line of argument suggests that religion promotes an optimistic, positive world-view that provides meaning to life experiences, particularly pain and suffering (e.g., George et al., 2002; Koenig, 2001d; Pargament, 1997). In Koenig and Larson (2001), the authors stated that "meaning provides a sense of purpose and direction. Consider the religious view of a forgiving, merciful, all-powerful God who is in control of one's circumstances and even the eternity that is beyond life, who is interested in people… and responds to their pleas for help and assistance" (p. 72). The authors note that this belief system can be juxtaposed with a religious view of a harsh, punitive God-figure that is detached, unattainable, critical and

even fearful, or to a view of the world that believes that all occurrences are a consequence of mere luck or chance. Koenig and Larson concluded that how individuals frame their worldview in a religious context can have profound implications for their mental, emotional, and physical life.

Medical sociologist Aaron Antonovsky introduced the theory Salutogensis, also known as the Sense of Coherence (SOC) model that speaks to the role of coherence or meaning in an effort to understand the conditions under which stress may affect health negatively. According to the model, beliefs that provide meaning, predictability, and manageability are important 'resistance resources' that allow a person to survive and cope with challenges as well as comprehend life events. Few studies have operationalized, measured, and empirically tested Antonovsky's SOC theoretical formulation (George et al., 2002), although previous research has found that personal meaning has implications for mental and physical health. For instance, Ellison (1991) found that existential certainty or existential coherence was associated with measures of psychological well-being. Similarly, studies of religious well-being, which tap into constructs such hope, optimism, and meaning derived from religious beliefs, consistently find significant inverse correlations with negative health indicators (e.g., Burbank, 1992; Carroll, 1993; Ryan, Rigby, & King, 1993).

Psychoimmunodorocrinological Functioning: A Promising Explanatory Pathway

Stress is associated with several mental and physical illnesses. These include psychological disorders such as anxiety and depression (Alonso et al., 2004; Chrousos & Gold, 1992) as well as physical problems including coronary artery disease, cancer, and mortality rates (Esch, Stefano, Fricchione, & Benson, 2002; Garssen, 2004; Nielsen,

Kristensen, Schnohr, & Gronbaek, 2008). As mentioned previously, religion is also associated with several key indicators of mental and physical well-being including depression, anxiety, cardiovascular disease, mortality rates, and cancer. Because of the congruence in health outcomes associated with both stress and religious faith, examining the relationship between stress and religion may provide additional clarity into the pathways that affect health and well-being. Because psychological stress triggers complex physiological reactions necessary to deal with a challenge, threat, or loss (Rubin, Paplau, & Salovey, 1993), focusing on biological processes linked to stress mobilization may be particularly helpful in understanding the relationship between religion, stress, and well-being. This connection focuses on the role that psychological stress plays in triggering the hypothalamic-pituitary-adrenal (HPA) and sympathetic-adrenomedullary (SAM) axes respectively.

In response to stress, the SAM system manages the release of catecholamines, causing an increase in heart rate and blood pressure, while the HPA secretes glucocorticoids, most notably cortisol, which has been shown to affect immunosuppresion, glucose production, fat metabolism, inflammatory response, and central nervous system functioning (Stone et al., 2001). The SAM and HPA responses to stress have been extensively researched and linked to a variety of negative health outcomes including depression, hypertension, coronary artery disease, among others (Chrousos & Gold, 1998; McEwen, 1998; Stone et al., 2001; Yehuda, 1997). However, these responses are moderated by individual differences and psychosocial factors such as perception of threat, social support resources, and coping methods (Dedert et al., 2004). Because previous research has demonstrated that religious faith intersects with the coping

process (Pargament et al., 1998), provides unique social support (Ellison et al., 1997), influences the stress appraisal process (Maltby & Day, 2004), one's religious faith represents a potentially important area of individual difference that may influence health and well-being. Koenig (2001c) proposed that if religious beliefs and practices help to reduce psychological stress through unique coping efforts, foster greater social support, prevent depression, enhance positive emotions as well foster greater hope and optimism, then religion may help to moderate or even mediate the potentially damaging physiological responses to stress. Therefore, an investigation of the relationship between religious faith and physiological markers of stress such as cortisol may reveal how these variables are linked to and influence health and well-being. Furthermore, McEwen (1998) stated that the implications of an examination of the biological activation of the stress response and an individual's religious beliefs may ultimately be prognostic for mental and physical disorders.

The study of religion/spirituality and neuroendocrine functioning is in its infancy. An extensive review of the literature yielded only 13 studies examining religious variables and neuroendocrine functioning, with cortisol as the most commonly operationalized method for assessing HPA reactivity. Koenig (2001d) reviewed eleven studies examining religious/spiritual involvement and neuroendocrine function. Nine of these studies assessed the effects of Eastern beliefs and meditative practices on HPA reactivity. Koenig's review found that every study showed a lower level of diurinal cortisol when spiritual beliefs and meditative practices were reported to be higher. Koenig concluded his review by stating that the results of the existing literature "support

the hypothesis that religious [spiritual] practices facilitate coping, thereby reducing stress-related hormone levels and improving immunity" (pg. 325).

While this research is very exciting and promising, it tends to say little about how organized religious beliefs and practices impact stress reactivity from a biological reactivity standpoint. How such religious factors may influence immune, endocrine, cardiovascular, and cellular functions remains largely unknown. Tataro, Leuken, and Gunn (2005) represent the first attempt to study the relationship between acute stress reactivity and self-reported religiousness and spirituality. While some of their results were mixed, the authors found an inverse association between greater levels of religiousness/spirituality and lower cortisol response after exposure to acute stress. The authors noted that studies which incorporate neuroendocrine functioning as a marker of health appear to be particularly useful in furthering our understanding in the relationship between religion and health. Seeman et al. (2003) suggest that the present time may be particularly opportune for an expanded program of research examining the relationship between religion and health through biological mechanisms. Recent innovations in biomarker measurement, including less time consuming and less invasive protocols such as salivary cortisol collection offer vast potential for understanding how neuroendocrine and immunologic pathways are associated with religious experiences, thoughts, emotions, beliefs, and practices. Studies that incorporate biological impacts of religiosity/spirituality appear to be a promising approach if we are to gain a clearer understanding of religion's effects upon health.

## Conclusion

Although there is no conclusive evidence that religious involvement is associated with better physical and mental health outcomes, the accumulating body of research points to religion's potential efficacy in these areas. As George et al. (2002) comment, the apparent inconsistencies in the literature are not necessarily contradictory. Rather, this dynamic suggests that there remains a large degree of complexity in the relationship between religion and health that we have not come to fully understand. Much work remains to continue to identify the mechanisms by which religion may affect physical and mental health.

There are a number of research methodologies and strategies that might address the complexity in the relationship between religiosity and health. First, a large number of nonrandomized observational studies dominates this literature, with serious issues of confounding common in most of the available studies. Studies that incorporate randomized trials and longitudinal designs represent the strongest research methodologies, although as Seeman et al. (2003) point out, such designs are often not viable (e.g., where beliefs and attitudes are of interest as compared with behaviors). If a study chooses a cross-sectional design, then sampling and controlling for potential confounding needs more rigorous attention. Second, studies are needed that focus on both religion and spirituality independently of one another. Spirituality in particular has been studied less frequently and tends to pose more challenges with regard to measurement (Aukst-Margetic & Margetic, 2005). Often in previous research, spirituality and religiosity are aggregated, which does not provide a clearer picture about how they might be different in affecting health outcomes (Seeman et al., 2003). Third, potential mediators have received little to no attention to date in studies that examine the

relationship between religious faith and health status. George et al. (2002) comment that most research to date has focused on religious factors that influence health independently. While this research approach has been a reasonable strategy, "it is based on the assumption that religion 'works' via standard risk and protective factors" (p. 198). A more purposeful approach to looking at potential mediators in the religion-health relationship may identify additional explanatory mechanisms that better predict health outcomes. As noted previously, a promising area of research that addresses this concern is how biological mechanisms related to stress may act as mediators of the religion-health connection. Lastly, nearly all of the research available that has examined stress to religious variables has focused on chronic stress. At present, the literature says very little about how acute stress among those with religious faith may affect mental and physical health outcomes, let alone how their experience of acute stress may be different from non-religious populations. Identifying the mechanisms by which religion may affect reactivity to acute stress has the potential to provide important insights into the religion's influence of health and well-being.

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# CHAPTER 2

## THE RELATIONSHIP BETWEEN RELIGIOSITY AND RELIGIOUS COPING TO STRESS REACTIVITY AND PSYCHOLOGICAL WELL-BEING

The past few decades have shown a tremendous increase in the number of studies examining the relationship of religious and spiritual variables to mental health outcomes (Aukst-Margetic & Margetic, 2004; Seeman, Dubin, & Seeman, 2003). Although some of the results are mixed, a growing body of evidence supports the hypothesis that religion/spirituality is linked to increased health and psychological well-being (Hackney & Sanders, 2003). Several clinical and epidemiological reviews have corroborated this trend. For example, Seybold and Hill (2001) reviewed multiple studies on the positive and negative effects of religion and found a preponderance of salutary effects that religion can have on both mental and physical well-being. Gartner, Larson, and Allen (1991) conducted a systematic review of sixteen published cross-sectional studies and concluded that the data supported the hypothesis that those with higher religious commitment had a decreased risk for depression and suicide, particularly among adolescent populations. Koenig and Larson (2001) reviewed over 850 studies and highlighted several positive associations between religiosity and health outcomes, particularly in the area of mental health. The authors concluded that those with higher levels of religiosity had significantly lower rates of depression and anxiety.

One theoretical framework that attempts to provide clarity in understanding the relationship between religiousness and well-being is *religious orientation* (Fabricatore,

Handal, Rubio, & Gilner, 2004). For example, several authors (e.g., Gorsuch, 1988; Maltby & Day, 2000) have suggested that religious orientation is related to psychological well-being and is comprised of three primary orientations or approaches to religion. An Intrinsic orientation is characterized by individuals with an internalized sense of religious faith that is evident in every aspect of life (Allport, 1966; Allport & Ross, 1967). Extrinsic orientation is distinguished by the use of religion to provide participation in a powerful in-group (Genia & Shaw, 1991), to provide access to protection and social status (Allport & Ross, 1967), and to be utilized as an ego defense mechanism (Kahoe & Meadow, 1981). Recent research (e.g., Maltby & Day, 2004) has suggested that an extrinsic orientation is comprised of two dimensions, *extrinsic-personal* (protection, consolation), and *extrinsic*-social (social status, social support). Finally a Quest orientation is characterized by an appreciation for existential doubt, paradox, and a rejection of simplistic explanations about the transcendent (Batson & Schoenrade, 1991a; 1991b; Boyatzis & McConnell, 2006).

A review of the literature suggests an intrinsic orientation towards religion is associated with better well-being outcomes, while an extrinsic orientation is likely to be associated with poor indicators of well-being. For example, intrinsic orientation is consistently related to fewer depressive symptoms and decreased trait anxiety, while an extrinsic orientation is related to an increase in depressive symptoms and trait anxiety (e.g., Genia & Shaw, 1991; Lewis, Maltby, & Day, 2005; Maltby & Day, 2000). The relationship between a Quest orientation and mental health remains unclear due to its fairly recent formulation as a dimension of religious orientation (Maltby & Day, 2003).

Specifically, results examining the relationship between Quest and outcome variables such as depression and anxiety remain mixed (Maltby, Lewis, & Day, 1999)

In addition to religious orientation, *religious coping* is another framework that provides theoretical guidance in understanding the relationship between religiousness and well-being. Pargament (1997) has suggested that religious coping significantly impacts the multidimensional process by which religion intersects and impacts a person's mental health. Consistent with Pargament's view, a number of studies (e.g., Pargament, Smith, Koenig, & Perez, 1998) have found that religious coping accounts for significant unique variance in the prediction of psychological well-being above and beyond nonreligious coping. Additionally, measures of religious coping have been shown to be stronger predictors of stressful situation outcomes than generic, dispositional measures of religiousness (e.g., frequency of religious service attendance, frequency of prayer etc.) or even religious orientation (Pargament, 1997; Pargament et al., 1998).

Pargament et al., (1998) proposed a two-factor model of religious coping, positive and negative religious coping, which describes the coping style one uses to reframe and deal with stressful experiences in a religious context. Positive religious coping includes coping efforts such as forgiveness, collaborative problem-solving with God, religious purification, benevolent religious reappraisals etc, while negative religious coping includes punitive religious appraisals, demonic reappraisals, spiritual discontent etc. Several cross-sectional studies have found that positive religious coping strategies are associated with increased psychological well-being, while negative religious coping strategies are generally related to more negative outcomes (e.g., Lewis et al., 2005; Maltby & Day, 2004; Pargament et al., 1990; Pargament et al., 1998). A recent meta-

analytic review of 49 studies by Ano and Vasconcelles (2005) supported the hypothesis that positive and negative forms of religious coping are related to positive and negative psychological adjustment to stress, respectively.

Despite recent research that has investigated the role of religious orientation and religious coping in the relationship between religion, stress, and well-being, our understanding of these complex relationships remains limited. Fabricatore et al. (2004) recommend that future research consider other conceptual models that explore the mediators and moderators between stress, religion, and mental health. Aukst-Margetic & Margetic (2005) suggested that the connection between religious variables and well-being can be understood through the frame of psychoimmunodocrinological research. Similarly, Seeman et al. (2003) recommended investigations of neurohormonal functioning as a way to explore potential mediators and moderators of the relationship between religiosity and health and well-being. These models suggest the role of the hypothalamic-pituitary-adrenal (HPA) axis in the physiological stress response, and its major hormonal byproduct, cortisol (Pruessner, Hellhammer & Kirschbaum, 1999). This conceptualization is theoretically consistent with previous research which has demonstrated an association between psychological stress and self-reported level of depression (Stroud, Davila, & Moyer, 2008) and anxiety (Connor, Vaishnavi, Davidson, Sheehan, & Sheehan, 2007). Additionally, research has also demonstrated an association between physiological markers of stress (e.g., cortisol) and psychological well-being including depression (Chrousos & Gold, 1992) and anxiety (Schiefelbein & Susman, 2006).

Researchers have identified several factors that moderate an individual's HPA activation including perception of threat (Blascovich & Tomka, 1996), social support (Ulchino, Cacioppo, & Kiecolt-Glaser, 1996), coping resources (Ursin, 1998), and other psychosocial factors such as relational affection and affirmation of personal values (Creswell et al., 2005; Floyd et al., 2007). Dedert et al. (2004) suggested that religious and spiritual factors may also play a role in the activation and regulation of the stress response, particularly cortisol reactivity. Preliminary evidence has supported this hypothesis by suggesting that religious or spiritual commitment may represent one source of individual variability in stress reactivity (Tartaro, Luecken & Gunn, 2005). However, research on neurohormonal functioning and religiosity is extremely limited. Although there are published studies that have investigated the relationship between religious/spiritual constructs and cortisol levels, these studies have typically focused on rhythmic cortisol levels in response to chronic health problems (e.g., Dedert et al., 2004; Ironson et al., 2002).

An extensive literature search revealed only one study in which spirituality and religiosity was studied in relation to cortisol reactivity after an acute stressor. This study, conducted by Tataro et al. (2005), specifically investigated gender effects on the influence of self-reported religiosity and spirituality on cortisol responses after exposure to a controlled lab stressor similar to the Stroop task (Stroop, 1935). In order to assess religious and spiritual variables, Tataro and colleagues administered the Brief Multidimensional Measurement of Religiousness/Spirituality (BMMRS; Fetzer Institute, 1999), which includes a single-item scale of religiousness, a single-item scale of spirituality, and a composite religiosity/spirituality score for the entire instrument.

Results of their study indicated that participants with a higher composite religiosity/spirituality scores, levels of forgiveness, frequency of prayer, and overall religiousness showed lower cortisol responses after acute stress exposure. Although this study represents an important step in linking physiological measures with indicators of individual belief systems, it tends to say little about the dynamic ways in which people use their religiosity in specific situations, as well as the specific religious coping activities employed in times of stress (Ano & Vasconcelles, 2005). Moreover, the BMMRS's use of single-item scales to assess religiosity or spirituality is problematic from a statistical standpoint, thus leading to some skepticism regarding some of the study's findings.

The purpose of this study was to investigate if acute stress reactivity was related to religiosity, religious coping, and psychological well-being such as depression and anxiety. Additionally, this study attempted to replicate Tataro et al.'s (2005) investigation of cortisol reactivity by also using a stroop task, as well as incorporating more sophisticated measures of religiosity and religious coping, while controlling for potential confounds which have plagued several prior studies (for a review see Seeman et al., 2003). Of note, because the theoretical understanding and operationalization of Quest religiosity is in its infancy, it was not included in the present investigation. Nonetheless, this study was designed to address the following research questions:

1. Is religiosity associated with stress reactivity (e.g., changes in cortisol level in response to an acute stressor) which is in turn related to psychological well-being?
2. Does stress reactivity relate to different religious coping styles?
3. Does stress reactivity mediate or moderate the relationship between religiosity and depression or anxiety?

4. Does stress reactivity mediate or moderate the relationship between religious coping and depression or anxiety?

In addition to these research questions, it was hypothesized that:

1. Intrinsic religiosity will be inversely related to cortisol reactivity after exposure to an acute stressor.
2. Extrinsic religiosity will be positively associated with cortisol reactivity after exposure to an acute stressor.
3. Negative religious coping with be associated with higher cortisol reactivity after exposure to an acute stressor as well as poorer indicators of psychological well-being.
4. Positive religious coping will be associated with lower cortisol reactivity after exposure to an acute stressor and healthier psychological well-being.
5. Cortisol reactivity after exposure to an acute stressor will mediate or moderate the relationship between intrinsic religiosity, extrinsic religiosity, and depression.
6. Cortisol reactivity after exposure to an acute stressor will mediate or moderate the relationship between extrinsic religiosity, extrinsic religiosity, and anxiety.
7. Cortisol reactivity after exposure to an acute stressor will mediate or moderate the relationship between religious coping and depression.
8. Cortisol reactivity after exposure to an acute stressor will mediate or moderate the relationship between religious coping and anxiety.

## Method

### *Participants*

Eighty participants from undergraduate psychology courses at a large southeastern university volunteered to participate in this study, which was promoted as a

study investigating the relationship between religious beliefs, stress, and psychological well-being. According to Kirschbaum and Hellhammer (1994; 1992), stringent inclusion criteria are recommended for cortisol and endocrine function related studies, as several factors have been identified that can affect normal HPA axis and free salivary cortisol release. As a result, individuals were warned prior to participating to refrain from smoking, eating, vigorous exercise, or consuming caffeine or alcohol for up to one hour before beginning the experiment. Moreover, participants were ineligible to participate if they were taking anti-depressives, anxiolytics or oral contraceptives, or had medical conditions that may affect normal cortisol functioning such as Cushing's syndrome and Hypercortisolism. Applying these pre-screening conditions to the sample resulted in no loss of subjects.

The age of the participants ranged from 18 to 56, with a median age of 20.75 (*SD = 5.92).* The sample (*N* = 80) included 64 females (80%) and 16 males (20%), representing diverse ethnic backgrounds (21% African American, 21% Caucasian, 19% Black, non-African, 16% Asian or Asian American, 1% Hispanic, 9% Multiracial/Multiethnic, and 13% Other). In terms of marital status, 83% of the participants were single, followed by 4% married, 8% in formally partnered relationships, and 4% were divorced. The sexual orientation of participants was 86% Heterosexual, 6% Bisexual, 5% Homosexual, and 3% declined to answer. Religious affiliation within the sample revealed 8% Roman Catholic, 1% Eastern Orthodox, 66% Protestant, 1% Wiccan/Spiritualist, 4% Islamic, 4% Hindu, 4% Buddhist, 6% Agnostic, 4% Atheist, and 2% of respondents did not respond. A breakdown of Protestant respondents revealed the following denomination affiliations: 1% Episcopalian/Anglican, 5% Methodist, 4%

Presbyterian, 26% Baptist, 1% Church of Christ, 1% Church of God, 3% Pentecostal, 11% Christian Church, 11% Non-Denominational, 3% Protestant-Other. Further analysis of demographic questionnaire data found that 16% (*N = 13*) described themselves as "very involved" in organized religion, 53% (*N = 42*) were "moderately involved," and 30% (*N = 24)* reported they were "not involved" at all with religion. However, when asked to rate their self-reported level of religiousness or spirituality, 46% stated they were "spiritual and religious," 37% of participants stated they were "spiritual and not religious," 11% stated they were "religious and not spiritual," 4% identified as "neither religious or spiritual."

*Measures*

*Center for Epidemiological Studies Depression Scale* (CES-D: Radloff, 1977). The CES-D is a 20-item self-report scale which measures current level of depressive symptomology. Respondents are asked to rate how they have felt or behaved during the past week on questions focused on depressive symptoms. Participants are asked to respond to items by ratings themselves on a scale from 1 = rarely or none of the time to 4= mostly or all the time. Scores range from 0 to 60, with higher scores indicating more symptoms of depression. CES-D scores of 16 to 26 are considered indicative of mild depression and scores of 27 or more are indicative of major depression. Radloff (1977) reported internal consistency reliability of ($\alpha$ =0.85). Similar reliability estimates have been reported in both young and older populations (e.g., Lewinsohn, Seeley, Roberts, & Allen, 1997). Additionally, The CES-D has been shown to correlate with other indices of depression, with numbers suggesting moderate convergent validity (Antony & Barlow, 2002). Cronbach's alpha for this sample was 0.91.

*The State-Trait Anxiety Inventory* (STAI; Spielberger, 1983). The STAI is a 40-item instrument designed to measure state and trait anxiety on two subscales comprised of 20 items respectively. Respondents rate their agreement with items on the State Anxiety subscale by using a 4-point Likert scale from ranging 1 =not at all to 4 =Very much so. On the Trait Anxiety subscale, respondents also use a 4-point scale ranging from 1 =Almost never to 4 =Almost always. Higher scores on either subscale indicate greater state or trait anxiety. Internal consistency ranges from 0.86 to 0.95 for the State Anxiety subscale and 0.89 to 0.91 for the Trait Anxiety subscale respectively (Spielberger, Gorsuch, & Lushene, 1970). Moreover, correlations between the trait subscale and other measures of trait anxiety such as the Taylor Manifest Anxiety Scale, the IPAT Anxiety Scale, and the Multiple Affect Adjective Check List have been reported at .80, .75, and .52, respectively (Spielberger et al., 1970). In a study by Sesti (2000), the STAI was reported to be an appropriate measure for studying anxiety in research and clinical settings. Internal consistency analysis for this sample revealed Cronbach's alpha was 0.93 for the State Anxiety subscale, and 0.94 for the Trait Anxiety subscale.

*The Brief Multidimensional Measure of Religiousness/Spirituality* (BMMRS; Fetzer & NIA, 1999). Participants completed a modified version (37 items) of the BMMRS which is designed for use in health research. The BMMRS is designed to assess dimensions of religiosity and spirituality such as Self-Rated Religiosity, Self-Rated Spirituality, Forgiveness, Private Religious Practices, Daily Spiritual Experiences, Religious Commitment, and overall religious coping. The BMMRS has multiple response formats throughout the measure depending upon the subscale from a 5-point, 4-

point and 8-point Likert scale to dichotomized formats such as 1=Yes and 2=No. Internal consistency reliability estimates for the BMMRS are generally reported to be greater than 0.70 (Neff, 2006). In Tataro et al. (2005), a total score for the BMMRS (Composite Religiosity/Spirituality) was calculated by summing items from key dimensions and analyzed as a continuous variable. Their analysis showed the composite score to have good reliability ($\alpha = .90$). Internal consistency for this sample was as follows: BMMRS - Composite scale, (.91), BMMRS - Forgiveness Subscale (.78), BMMRS - Private Religious Practices Subscale (.83), BMMRS – Daily Spiritual Experiences Subscale (.87), and BMMRS - Overall Commitment Subscale (.46).

*The Brief Religious Coping Scale* (Brief RCOPE; Pargament et al., 1998). The Brief RCOPE is a 14-item measure designed to assess religious/spiritual methods to deal with stress. Factor analysis reveals two factors, a positive religious coping factor that reflects benevolent religious involvement in the search for meaning and significance, and a negative factor that indicates maladaptive approaches to coping. Respondents are asked to indicate the frequency with which they use a particular approach to coping to deal with a stressful situation by using a 4 point Likert scale ranging from 1 =Not at all to 4 = A great deal. Internal consistency and discriminate validity has been well-established with the Brief RCOPE, which yields a Cronbach's alpha estimate of .90 for the positive coping subscale and .81 for the negative coping subscale (Pargament et al., 1998). Pargament et al (1998) further report this version's factor structure and concurrent validity in samples of college students, the elderly and hospitalized patients. Cronbach's alpha for this sample was 0.91 for the Positive Coping subscale and 0.74 for the Negative Coping subscale.

*The Age-Universal I-E-Revised Scale* (I/E-R; Gorsuch & McPherson, 1989). This 14-item scale is an amended measure of religiosity on a set of items from the original Age-Universal I-E Scale (Gorsuch & Venable, 1983). Eight items load on an intrinsic orientation factor. Three items load on a factor labeled extrinsic-personal and three items load on an extrinsic-social factor. The total scale represents a psychometric improvement upon its parent scale, particularly among religious and non-religious populations. Responses are measured on a Likert scale (from 1=Strongly disagree, to 5=Strongly agree). Higher scores indicate higher levels of a given religious orientation. Reported internal consistencies (Tiliopoulos, Bikker, Coxon, & Hawkin, 2006) are .86 for the intrinsic subscale, .76 for the extrinsic-social subscale, and .69 for the extrinsic-personal subscale. Gorsuch & McPherson (1989) report good discriminate validity with the Age-Universal I-E-Revised Scale. Cronbach's Alpha for this sample was as follows: Intrinsic Subscale (.80), Extrinsic-Personal Subscale (.77), and Extrinsic-Social Subscale (.77).

*Procedure*

Consistent with the recommendations of Kirschbaum and Hellhammer (1994; 1992) in order to control for the natural circadian rhythm of cortisol release, experimental sessions began between 1:00 and 5:00pm. Prior to arriving, all subjects received pre-screening requirements electronically directing them to abstain from smoking, physical exercise, eating, and consuming caffeine or alcohol for up to one hour prior to participation. If a subject did not meet the pre-screening requirements, his or her testing session was rescheduled. This occurred on one occasion and the participant was rescheduled for another testing session resulting in no loss of recruited subjects. To ensure uniformity of testing procedures, participants received standardized instructions

read from a script by an examiner. After signing a consent form, participants were first administered the Trait subscale of the State-Trait Anxiety Inventory (Spielberger, 1983). Upon completion, the examiner collected the first (baseline) saliva sample using Salivette kits produced by Sarstedt Inc., Rommelsdorf, Germany, which consist of a small roll of sterile cotton gauze that is stored inside a plastic tube. Participants saturated the cotton gauze with saliva by holding it in their mouths for a 2-minute period, and then sealed the sample in its accompanying plastic tube.

After the baseline saliva measure was collected, participants began the lab stressor, in this case a computerized version of the Stroop Color-Word test or "Stroop" (cf. Stroop, 1935). The Stroop assesses an individual's performance of focusing on one particular feature of a task, while blocking out other features. In this case, the task is to identify the color a word is printed in while blocking out the analogous task of reading the name of the color printed (i.e., naming the color that the word is written in rather than what color the word spells). This incongruence has been shown to impair the speed of cognitive performance (Elst, Boxtel, Breukelen, & Jolles, 2006) and elicit stress in the examinee. A recent review by Siska (2002) reported that the Stroop color-word test is an effective experimental stressor to produce sympathetic nervous system activity related to HPA activity. The Computerized Stroop Test software for this study was provided by The Psych Lab™ at Washington University. As described by the test software publisher, on each trial, the subject was presented with a string of letters printed in color. The subject's task was to respond to the color in which the word is printed by pressing the correct key as quickly as possible. The appropriate keys to press for each color were as follows: red = z, green = x, blue = ., yellow = /. If the response was incorrect, or if an

invalid key was pressed, a short tone was presented. There were three conditions presented in separate blocks throughout the test. In condition 1 the letter string was composed of X's. In condition 2 the letter string was the word 'red', 'green', 'blue', or 'yellow' printed in a color different from the named color. In condition 3 the letter string was the name of the color that the letters were printed in. Completion time of this Stroop task was approximately twelve minutes.

Following completion of the Stroop task, participants completed the remaining pencil-and-paper measures including the Center for Epidemiological Studies Depression Scale (CES-D; Radloff, 1977), State subscale of the State-Trait Anxiety Inventory (STAI; Spielberger, 1983), Brief Multidimensional Measure of Religiousness/Spirituality (BMMRS; Fetzer & NIA, 1999), Brief Religious Coping Scale (Brief RCOPE; Pargament et al., 1998), and the Age-Universal I-E-Revised Scale (Gorsuch & McPherson, 1989). After twenty minutes had elapsed, participants were asked to stop taking their questionnaires in order to give the final saliva sample, as twenty to twenty-five minutes is considered optimal to capture peak cortisol response after an acute stressor (Dickerson & Kemeny, 2004). After the giving a second saliva sample participants completed all remaining measures.

Once the cortisol samples were collected, they were immediately frozen and later delivered to the Yerkes Core Laboratory (Emory University, Atlanta, Georgia) for analysis. The lab performed immunoassays on each saliva sample to determine the amount of cortisol present, which involves thawing the samples and having them spun at low speed to obtain saliva of low viscosity for cortisol assay. A coefficient of the amount of cortisol molecules present in both the pre and post samples was provided in a

spreadsheet format. Raw cortisol change was obtained by subtracting pre-test cortisol levels from the post-test levels (post minus pre). Although there are several methods used in endocrinological research to analyze cortisol change, following analysis procedures outlined by Bonate (2000), magnitude of change between pre-and post-test scores (i.e., cortisol reactivity) was assessed by converting raw change scores into a proportional change score. This was computed by dividing the absolute value of raw cortisol change by pre-test cortisol level.

## Results

Prior to any cortisol analyses, pre- and post-test levels of salivary cortisol levels were temporarily standardized using z-score transformation to identify potential outliers. Two participant's data represented four or more standard deviations from the mean (bi-directional). Following the recommendations of Smyth et al. (1988), data from these participants were removed from any subsequent analyses, resulting in a sample of 16 male and 62 female participants ($N$ = 78). The remaining sample pre- and post-test cortisol levels were logarithmically transformed and compared to raw pre- and post-test cortisol levels. The two samples did not differ in distribution shape therefore raw cortisol levels were used in all subsequent analyses.

A paired-samples $t$ test was calculated to compare the baseline cortisol score to the post-test cortisol levels after exposure to the controlled stressor. A significant decrease from pretest to posttest was found ($t(77) = 6.92$, $p = .001$, $d = .55$). This suggests that there was a significant cortisol reactivity to the stressor task. Next, gender differences among pre- and post-cortisol levels were examined. No significant differences were found between men and women in pre-cortisol levels, ($t(76) = .99$, $p$ =

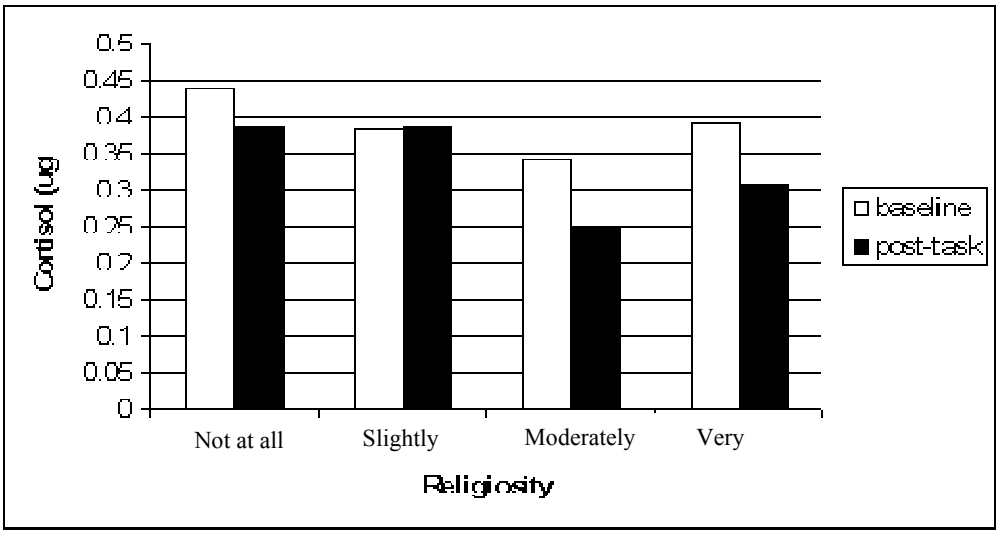
.13), or in post-cortisol levels, ($t(76) = .63$, $p = .64$) (see Table 1). Gender differences among BMMRS subscales were also examined by running Independent-samples *t* tests. Results indicated that females reported higher levels of forgiveness ($p = .01$), private religious practices ($p = .02$), daily spiritual experiences ($p = .01$), overall religious coping ($p = .04$), and composite religiosity spirituality ($p = .03$) than compared to males. Men and women did not differ in self-religiosity ($p = .08$), self-rated spirituality ($p = .13$), or overall religious commitment ($p = .91$). Further analysis revealed no gender differences in reported levels of depression ($p = .61$), state anxiety ($p = .54$), trait anxiety ($p = .22$), or negative religious coping ($p = .19$), although females reported higher levels of intrinsic religiosity ($p = .04$) and positive religious coping ($p = .01$).

Replicating the analysis procedures of Tataro et al. (2005), to evaluate the impact of composite religiosity/spirituality on cortisol responses, a model of repeated measures General Linear Models (GLM; SPSS 12.0) was conducted with cortisol at each time period as the dependent variable, composite religiosity/spirituality, gender, and the composite religiosity/spirituality by gender interaction as between-subjects factors, and period (baseline, post-task) as within-subjects factors. The composite religiosity/spirituality by gender interaction was not statistically significant, $F(1, 74) = .78$, $p = .38$, therefore the interaction term was dropped from the model. Next, the hypothesis that participants with higher composite religiosity/spirituality would be significantly related to cortisol level was tested. Again, results indicated that composite religiosity/spirituality did not show a main effect on overall cortisol level, $F(1, 75) = .09$, $p = .77$). Furthermore, a partial correlation analysis revealed that post-task cortisol levels

were not significantly related to composite religiosity/spirituality after controlling for baseline cortisol ($r$ = .29).

Although composite religiosity/spirituality levels were not significantly related to cortisol level, separate effects of religiosity and spirituality were examined next. Overall religiosity was analyzed first in relation to cortisol level. A repeated measures ANOVA ($F(1, 74) = .00$, $p = .99$) offered no evidence for an interaction between overall religiosity and gender, therefore the interaction term was removed from the model. However, once the interaction term was dropped, a significant repeated measures ($F(1, 75) = 4.44$, $p = .03$) effect was found for time period suggesting that pre-test cortisol level was higher than post test cortisol level. A partial correlation analysis showed that post-task cortisol levels were not significantly related to religiosity level after controlling for baseline cortisol ($r$ = .28). Figure 1 further highlights pre- and post-test cortisol levels among those who rated themselves 'not at all religious' to those who rated higher degrees of religiosity.

*Figure 1* – Cortisol levels among self-reported religiosity levels

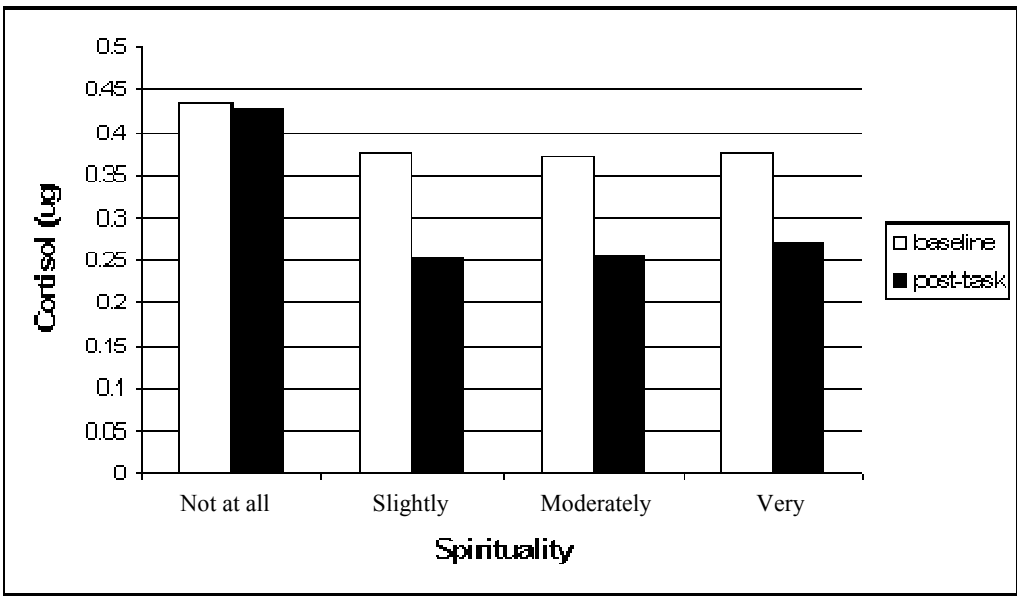


Although an examination of Figure 1 suggested less post-test cortisol level among those whose religiosity levels were self-rated as 'moderately' or 'very,' a one-way ANOVA found no statistical difference in post-task cortisol level among the groups ($F(3, 74) = 1.78$, $p = .16$). Moreover, a second one-way ANOVA found no statistical differences between level of self-reported religiosity and baseline cortisol level ($F(3, 74) = .48$, $p = .70$).

Self-rated spirituality was also examined in relation to overall cortisol level. A repeated measures ANOVA ($F(1, 74) = 1.40$, $p = .24$) found a non-significant interaction between overall spirituality and gender, therefore the interaction term was removed from the model. No main effect was found once the interaction term was dropped from the model ($F(2, 75) = .993$, $p = .38$) suggesting that a higher levels of reported spirituality was not associated with lower overall cortisol level. A partial correlation analysis showed that post-task cortisol levels were not significantly related to spirituality level after controlling for baseline cortisol ($r = .24$). Figure 2 illustrates cortisol levels from respondents who rated themselves as 'not very spiritual' to those who endorsed higher levels of spirituality. A one-way ANOVA found no significant difference in baseline cortisol between the self-rated spirituality groups ($F(3, 74) = .24$, $p = .87$). However, a second one-way ANOVA found a statistically significant difference between level of self-reported spirituality and post-task cortisol level ($F(3, 74) = 2.78$, $p = .04$). Post hoc testing using Tukey's procedure revealed significant differences between those whose self-rated spirituality was 'not at all' and those who rated themselves 'slightly spiritual' ($p = .04$) or 'moderately spiritual' ($p = .03$). Specifically, those who rated themselves as 'not at all' spiritual had statistically higher baseline and post-task cortisol levels

compared to those rated themselves ‘slightly spiritual,’ ‘moderately spiritual,’ and ‘very spiritual.’ There was no statistical difference between the ‘not at all’ group to those who rated themselves as ‘very spiritual’ although it was near significance ($p$ =.06).

*Figure 2* - Cortisol levels among self-reported spirituality levels




Finally, cortisol level was also examined in relation to specific religious and spiritual practices among BMMRS subscales. A series of partial correlations highlighted no significant associations between post-task cortisol levels and forgiveness ($r$ = -.13), religious commitment ($r$ = .10), daily spiritual experiences ($r$ = -.17), private religious practices ($r$ = -.05), or overall religious coping ($r$ = -.10) after controlling for pre-task cortisol levels.

To extend Tataro et al. (2005)’s investigation, psychological well-being outcome measures such as depression, state anxiety, and trait anxiety, as well as forms of religiosity (i.e., intrinsic, extrinsic-personal, extrinsic-social) and methods of religious coping (i.e., positive and negative) were examined in relation to cortisol reactivity. Correlations, means, and standard deviations for all of the measures in this phase of the

study are presented in Table 1. Primary analyses indicated that depression was not significantly related to pre-task cortisol levels ($r$ = -.10), post-task cortisol levels ($r$ = -.18), and overall cortisol reactivity ($r$ = .03). Additionally, state anxiety was not significantly related to pre-task cortisol levels ($r$ = .05), post-task cortisol levels ($r$ = -.02), or cortisol reactivity ($r$ = -.06). Lastly, trait anxiety was not significantly associated with pre-task cortisol levels ($r$ = -.04), post-task cortisol levels ($r$ = -.08), or overall cortisol reactivity ($r$ = .03).

Further analyses indicated that intrinsic religiosity was not significantly related to cortisol reactivity ($r$ = -.11). Concerning psychological well-being, intrinsic religiosity was negatively associated with depression ($r$ = -.05) although not significantly. Furthermore, intrinsic religiosity was negatively related to state anxiety ($r$ = -.15) and trait anxiety ($r$ = -.18) although neither were found to be statistically significant. Extrinsic-personal religiosity was inversely related with cortisol reactivity ($r$ = -.04), although the strength of the relationship was not statistically significant. A significant negative relationship resulted between extrinsic-personal religiosity and pre-task cortisol level ($r$ = -.28, $p < .05$) and post-task cortisol level ($r$ = -.31, $p < .01$). Extrinsic-personal religiosity had a direct and significant relationship to depression ($r$ = .29, $p < .05$), but had a weak although positive relationship with state anxiety ($r$ = .14) and trait anxiety ($r$ = .16). Extrinsic-social religiosity was positively related with cortisol reactivity ($r$ = .02), but again the relationship was weak and not considered statistically significant. Extrinsic-social religiosity had a weak relationship with pre-task cortisol ($r$ = .07) and post-task cortisol level ($r$ = -.09). Furthermore, extrinsic-social religiosity had a positive

Table 1 - *Descriptive Statistics*

| | Overall | Women | Men |
|---|---|---|---|
| Composite religiosity/spirituality | 106.5 (25.4) | 109.6 (25.0) | 94.7 (23.9) |
| Religiosity | 2.6 (.8) | 2.6 (.8) | 2.3 (.7) |
| Spirituality | 2.9 (.9) | 3.1 (.9) | 2.6 (1.0) |
| Baseline Cortisol (µg/dl) | .37 (.2) | .36 (.21) | .41 (.15) |
| Post-task Cortisol (µg/dl) | .27 (.14) | .26 (.14) | .29 (.14) |

*Note:* Data represents means (SD) for composite religiosity/ spirituality, religiosity, spirituality and pre and post cortisol levels.

Table 2 - *Bivariate Correlations, Means, and Standard Deviations*

| Measure | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | *M* | *SD* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. Trait Anxiety | - | .68** | .82** | -.18 | .16 | .07 | -.02 | .52** | -.14 | 36.43 | 10.79 |
| 2. State Anxiety | | - | .69** | -.15 | .14 | .05 | .01 | .39** | -.13 | 35.88 | 11.50 |
| 3. Depression | | | - | -.05 | .29* | .10 | .24* | .63** | -.01 | 34.79 | 10.80 |
| 4. Intrinsic Religiosity | | | | - | .36** | .08 | .70** | -.09 | .70** | 23.78 | 5.57 |
| 5. Extrinsic-Personal Religiosity | | | | | - | .19 | .57** | .34** | .41** | 10.51 | 2.97 |
| 6. Extrinsic-Social Religiosity | | | | | | - | .16 | .16 | .17 | 4.43 | 2.08 |
| 7. Positive Religious Coping | | | | | | | - | .32** | .70** | 14.29 | 6.26 |
| 8. Negative Religious Coping | | | | | | | | - | .12 | 4.69 | 4.86 |
| 9. Private Religious Practices | | | | | | | | | - | 18.46 | 8.15 |

*Note:* $*p < .05$; $**p < .01$

Table 2 (continued) - *Bivariate Correlations, Means, and Standard Deviations*

| Measure | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | *M* | *SD* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. Trait Anxiety | -.04 | -.25* | -.18 | -.11 | -.26* | -.15 | -.04 | -.08 | .03 | 36.43 | 10.79 |
| 2. State Anxiety | -.09 | -.10 | -.06 | .01 | -.30** | -.09 | .05 | -.02 | -.06 | 35.88 | 11.50 |
| 3. Depression | .08 | -.06 | .09 | .05 | -.04 | .07 | -.10 | -.18 | .03 | 34.79 | 10.80 |
| 4. Intrinsic Religiosity | .55** | .52** | .67** | .50** | .52 | .77** | -.02 | .01 | -.11 | 23.78 | 5.57 |
| 5. Extrinsic-Personal Religiosity | .26* | .34** | .47** | .25* | .24* | .48** | -.28* | -.31** | -.04 | 10.51 | 2.97 |
| 6. Extrinsic-Social Religiosity | .33** | -.01 | .16 | .08 | .14 | .24* | .07 | -.09 | .02 | 4.43 | 2.08 |
| 7. Positive Religious Coping | .48** | .74** | .73** | .54** | .44** | .81** | -.14 | -.23* | -.10 | 14.29 | 6.26 |
| 8. Negative Religious Coping | .11 | .10 | .05 | .09 | -.01 | .14 | -.04 | -.18 | .10 | 4.69 | 4.86 |
| 9. Private Religious Practices | .55** | .58** | .67** | .53** | .51** | .90** | -.03 | -.06 | -.05 | 18.46 | 8.15 |

*Note:* *$p < .05$; **$p < .01$

Table 2 (continued) - *Bivariate Correlations, Means, and Standard Deviations*

| Measure | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | *M* | *SD* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 10. Religious Commitment | -.04 | -.09 | .08 | .55** | .26* | .33** | .48** | .10 | .59** | 7.80 | 4.48 |
| 11. Forgiveness | -.25* | -.10 | -.06 | .52** | .34** | -.01 | .74** | .10 | .58** | 9.03 | 2.46 |
| 12. Daily Spiritual Experiences | -.18 | -.06 | .09 | .67** | .47** | .16 | .73** | .05 | .67** | 24.38 | 7.14 |
| 13. Overall Spirituality | -.11 | .01 | .05 | .50** | .25* | .08 | .54** | .09 | .53** | 2.97 | .95 |
| 14. Overall Religiousness | -.26* | -.30 | -.04 | .52** | .24* | .14 | .44** | -.01 | .51** | 2.56 | .79 |
| 15. BMMRS Composite | -.15 | -.10 | .07 | .77** | .48** | .24* | .81** | .14 | .90** | 106.53 | 25.36 |
| 16. Cortisol Pre | -.04 | .05 | -.10 | -.02 | -.28* | .06 | -.14 | -.04 | -.03 | .37 | .20 |
| 17. Cortisol Post | -.08 | -.02 | -.18 | .01 | -.31** | .09 | -.23* | -.18 | -.06 | .27 | .14 |
| 18. Cortisol Reactivity | -.02 | -.04 | -.04 | -.03 | -.19 | .10 | -.05 | .05 | -.04 | .12 | .10 |

*Note:* *$p < .05$; **$p < .01$

Table 2 (continued) - *Bivariate Correlations, Means, and Standard Deviations*

| Measure | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | *M* | *SD* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 10. Religious Commitment | - | .22 | .47** | .31** | .43** | .71** | .02 | -.05 | -.22 | 7.80 | 4.48 |
| 11. Forgiveness | | - | .56** | .48** | .50** | .65** | -.13 | -.18 | -.01 | 9.03 | 2.46 |
| 12. Daily Spiritual Experiences | | | - | .56** | .47** | .85** | -.24* | -.29** | -.08 | 24.38 | 7.14 |
| 13. Overall Spirituality | | | | - | .36** | .61** | -.08 | -.15 | -.13 | 2.97 | .95 |
| 14. Overall Religiousness | | | | | - | .60** | -.08 | -.10 | .05 | 2.56 | .79 |
| 15. BMMRS Composite | | | | | | - | -.11 | -.16 | -.10 | 106.53 | 25.36 |
| 16. Cortisol Pre | | | | | | | - | .79** | .01 | .37 | .20 |
| 17. Cortisol Post | | | | | | | | - | -.19 | .27 | .14 |
| 18. Cortisol Reactivity | | | | | | | | | - | .12 | .10 |

*Note:* *$p < .05$; **$p < .01$

but weak relationship with depression ($r$ = .10), as well as with state anxiety ($r$ = .05) and trait anxiety ($r$ = .07).

An examination of the relationship between positive religious coping and cortisol level revealed a non-significant negative relationship with pre-task cortisol levels ($r$ = -.14), although a significant negative association was found between post-task cortisol levels and positive religious coping ($r$ = -.23, $p$ < .05). There was no significant relationship found between overall cortisol reactivity and positive religious coping ($r$ = -.10). There was a significant positive relationship found between positive religious coping and depression ($r$ = .24, $p$ < .05), although no significant relationship was found between positive religious coping and state anxiety level ($r$ = .01) and trait anxiety ($r$ = -.02).

Negative religious coping was inversely but not significantly related to pre-task cortisol level ($r$ = -.04), as well as post-task cortisol level ($r$ = -.18). Cortisol reactivity was positively related with negative religious coping although the relationship was non-significant ($r$ = .10). Negative religious coping was significantly related to depression ($r$ = .63, $p$ < .01), state anxiety ($r$ = .39, $p$ < .01), and trait anxiety ($r$ = .52, $p$ < .01).

*Multiple Regression Analyses*

Because there were no statistically significant correlations between cortisol reactivity and indicators of psychological well-being, models of mediation were not explored. However, several multiple regression analyses were performed for each criterion variable: depression, state anxiety, and trait anxiety with moderation effects examined specifically. Predictor variables included in the regression model were cortisol reactivity, intrinsic religiosity, extrinsic-social religiosity, extrinsic-personal religiosity,

positive religious coping, and negative religious coping. The first outcome variable examined was depression. Results indicated that when the predictor variables were regressed on depression, the resulting model was significant ($F(6, 71) = 7.94$, $p < .01$) with an $R^2 = .40$, suggesting 40% of the variation in depression can be explained by differences in religiosity, approaches to religious coping, and cortisol reactivity (see Table 3). However, negative religious coping was the only predictor variable shown to have a significant standardized beta coefficient. This suggests that greater negative religious coping behaviors were associated with increased depression.

For additional clarity, a supplementary multiple regression analysis was conducted to test for a moderator effect in which cortisol reactivity, negative religious coping, and an interaction term (Cortisol Reactivity x Negative Religious Coping) was regressed on depression. Results showed the interaction term did not contribute a significant amount of variance ($F$ change = .27, $p = .60$). The lack of significance of the interaction term suggested that cortisol reactivity did not moderate the relationship between negative religious coping and depression.

Table 3 - *Multiple Regression Analysis for Variables Predicting Depression*

| Variable | *B* | *SE B* | *β* |
|---|---|---|---|
| Intrinsic Religiosity | -.13 | .28 | -.03 |
| Extrinsic Religiosity - Personal | .32 | .42 | .09 |
| Extrinsic Religiosity - Social | -.06 | .49 | -.01 |
| Positive Religious Coping | .09 | .28 | .05 |
| Negative Religious Coping | 1.29 | .25 | .58** |
| Cortisol Reactivity | -1.47 | 4.99 | -.03 |

* $p < .05$, ** $p < .01$

Next, a multiple linear regression was calculated to predict trait anxiety based on the predictor variables. The resulting model was significant ($F(6, 71) = 5.65$, $p < .01$) and accounted for 32% of the variation in trait anxiety. An examination of the beta coefficients found that only negative religious coping was significant (see Table 4). The direction of the beta coefficients showed that higher negative religious coping behaviors was associated with higher levels of trait anxiety. An additional multiple regression analysis was conducted to explore moderation effects between cortisol reactivity, negative religious coping, and an interaction term (Cortisol Reactivity x Negative Religious Coping) upon trait anxiety. Results showed the interaction term did not contribute a significant amount of variance ($F$ change = 0.82, $p = .78$). The lack of statistical significance of the interaction term suggested that cortisol reactivity did not moderate the relationship between negative religious coping and trait anxiety.

Table 4 - *Multiple Regression Analysis for Variables Predicting Trait Anxiety*

| Variable | *B* | *SE B* | *β* |
|---|---|---|---|
| Intrinsic Religiosity | .08 | .30 | .04 |
| Extrinsic Religiosity - Personal | .45 | .44 | .12 |
| Extrinsic Religiosity - Social | .01 | .52 | .00 |
| Positive Religious Coping | -.54 | .30 | -.31 |
| Negative Religious Coping | 1.30 | .27 | .59** |
| Cortisol Reactivity | -2.81 | 5.31 | -.05 |

* $p < .05$, ** $p < .01$

Lastly, the predictor variables were regressed on state anxiety. The resulting model was significant ($F(6, 71) = 2.83$, $p < .05$) and accounted for 19% of the variance. As with the other outcome variables, the standardized beta coefficient for negative religious coping was the only statistically significant predictor variable (see Table 5). This suggests that a higher level of negative religious coping behaviors is associated with higher levels of state anxiety. Finally, a multiple regression analysis was conducted to test for a moderator effect in which cortisol reactivity, negative religious coping, and an interaction term (Cortisol Reactivity x Negative Religious Coping) was regressed on state anxiety. Results showed the interaction term did not contribute a significant amount of variance ($F$ change = 0.06, $p = .81$). The lack of statistical significance of the interaction term suggested that cortisol reactivity did not moderate the relationship between negative religious coping and state anxiety.

Table 5 - *Multiple Regression Analysis for Variables Predicting State Anxiety*

| Variable | *B* | *SE B* | *β* |
|---|---|---|---|
| Intrinsic Religiosity | -.08 | .35 | -.04 |
| Extrinsic Religiosity - Personal | .44 | .52 | .11 |
| Extrinsic Religiosity - Social | -.06 | .60 | -.01 |
| Positive Religious Coping | -.33 | .35 | -.18 |
| Negative Religious Coping | .99 | .31 | .42** |
| Cortisol Reactivity | -6.58 | 6.81 | -.12 |

* $p < .05$, ** $p < .01$

## Discussion

This study investigated the potential relationship between stress reactivity, psychological well-being, and indicators of religious and spiritual belief systems. The first aim of this study was to replicate Tataro et al.'s (2005) study which found evidence that: 1) higher religiosity was related to decreased cortisol reactivity after exposure to acute stress; 2) greater stress reactivity was related to higher composite religiosity/spirituality scores; 3) lower cortisol reactivity was related to higher levels of specific religious and spiritual practices including frequency of prayer and forgiveness; and 4) gender was unrelated to cortisol level and stress reactivity. Results of the present study predominately failed to replicate Tataro et al.'s results. For example, in the current study, higher composite religiosity/spirituality was not related to lower overall cortisol and less reactivity after acute stress exposure. Additionally, although post-task cortisol levels were associated with higher self-rated religiosity, the current findings did not find a

relationship between levels of religiosity and cortisol reactivity. This finding was consistent regardless of an individual's magnitude of reported religiosity or if individuals reported they were non-religious all-together. This is inconsistent with the results of Ironson et al.'s (2002) study, which found evidence that higher religiousness/spirituality was related to lower cortisol levels in HIV positive men who were dealing with a chronic and life-altering illness as opposed to acute stress. Furthermore, Powell, Shahabi, and Thoresen (2003) review of the literature suggested that although religiosity in particular seems to be related to indicators of mental health, what seems to be most important is 'any degree of religious faith' as opposed to none.

One possible explanation for these contradictory findings may be found in a transactional model of stress. This theory, proposed by Lazarus and Folkman (1984), suggested that stress is a result when one's perceived demands are greater than one's perceived ability to cope with those demands. Central to this theory are two processes that impact the potentiality of triggering the stress response. The first process, primary appraisal, involves an evaluation of the stressor at hand and if it poses a threat or risk. Secondary appraisal refers to the evaluation of the resources available to cope with demands or stressors. While religiosity has been shown to impact secondary appraisals (Maltby & Day, 2003) as well as buffer against the effects of chronic stress (Dedert et al., 2004; Woods, Antoni, Ironson, & Kling, 1999), we know very little about how or whether religious factors impact primary appraisals when faced with acute stress specifically. For example, in the Maltby & Day (2003) study, participants rated how they appraised stressors (e.g., a challenge, threat, loss, etc.) retrospectively and were not specific regarding hassles, or chronic or acute stressors. It might be that when faced with

an acute stressor, which causes a quick or virtually immediate physiological reaction/mobilization, one's religious faith only impacts the secondary appraisal process. In Dedert et al. (2004), the authors offer a similar hypothesis in that it is possible that 'religiosity may not assist in the coping process until after a stressor has been appraised' (p.75).

In addition, the present results do not support Tataro et al.'s findings that frequency of prayer and forgiveness are associated with less cortisol reactivity. This was surprising given previous research that has found inverse associations between both forgiveness and frequency of prayer and physiological markers of stress (e.g., Ironson et al., 2002; Lawler et al., 2005; Worthington & Berry, 2001). It could be that there was no significant association between stress reactivity and frequency of prayer in the current study due to the lack of specificity assessed in one's prayer behaviors. To better understand how prayer may be related to mental health, it would be important to specify how different kinds of prayer (e.g., praying at meals versus contemplative prayer) might have differential effects on physiological reactivity. With regard to forgiveness, our understanding of the relationship between forgiveness tendencies and physical markers of stress is in its infancy although the data to date tends to support an association (Lawler et al., 2005). It is possible that there was no observed association between cortisol reactivity and forgiveness in the present study due to methodological issues related to forgiveness itself. Recent research (see Lawler et al., 2003) has predominately focused on forgiveness as a two-factor model (i.e., state forgiveness and trait forgiveness). Such a distinction was not included in the present study and may have provided a more clear understanding in investigating a possible stress reactivity-forgiveness link.

An interesting finding, consistent with Tataro et al.'s investigation was that gender was unrelated to cortisol level, religiosity or spirituality. This was surprising considering previous research which has highlighted gender differences in cortisol response when under stress (Kirschbaum, Wust, and Hellhammer, 1992). In addition, previous research has noted significant gender differences in religious participation, religious commitment, and spirituality (for a review see Francis, 1997), although this has not been found to be universal (Simpson, Cloud, Newman, & Fuqua, 2008). Thompson (1991) proposed that the relationship between religiosity and gender might be better explained by gender orientation (feminine or masculine) rather than by being female or male. Lastly, self-related spirituality was also unrelated to cortisol reactivity in the present study. This result was also consistent with Tataro and colleague's findings, yet is also surprising in light of emerging evidence elsewhere, which has found an inverse relationship between expressed levels of spirituality and cortisol levels (e.g., MacLean et al., 1994). Perhaps the incongruence in results can be explained in that the construct of spirituality remains poorly understood and operationalized. Notable scholars (e.g., Miller & Thoresen, 2003) have commented that due to our varied understanding of what spirituality is and is not, results of studies investigating the construct are likely to remain inconsistent and fragmented.

A second major aim of this study was to incorporate more sophisticated measures of religiosity as well as to assess forms of religious coping in relation to psychological well-being outcomes such as depression and anxiety. Findings of this study showed that cortisol reactivity was not related to any measures of psychological well-being. This result was surprising, as previous research has demonstrated relatively robust associations

between cortisol reactivity and depression (Tafet & Bernardini, 2003; Tafet, Toister-Achituv, & Schinitzky, 2001). Most notable is that state or trait forms of anxiety were not significantly related to pre, post, or cortisol reactivity scores. Because anxiety can be central to physiological arousal associated with the stress response and sympathetic nervous activity, this finding is particularly curious. Recent research has also found support that cortisol levels are associated with anxiety levels. For example, in Schiefelbein and Susman (2006), the researchers found that cortisol levels and longitudinal cortisol change were predictive of self-reported anxiety levels.

Results of the study further indicated that religiosity, either intrinsic, or extrinsic-personal or extrinsic-social was not significantly related to cortisol reactivity, although extrinsic-personal religiosity was significantly associated with pre- and post-task cortisol. Nonetheless, several of the correlations were in the hypothesized direction. For example, intrinsic religiosity had a weak but negative association with cortisol reactivity, and extrinsic-social was also negatively related to cortisol reactivity although the association was also weak. It might be that religiosity may still be related to stress, although the current findings suggest that it may not be related to acute stress rather than more chronic forms of stress, hassles etc.

Concerning religious coping, neither positive nor negative forms of religious coping were significantly related to cortisol reactivity, although positive religious coping was inversely associated with post-task cortisol levels. A rather surprising finding was that positive religious coping was not significantly negatively associated with depression. This was unexpected given previous research, which has shown a relatively consistent and robust negative association between positive religious coping and depression (e.g.,

Ano & Vasconcelles, 2005; Pargament, Koenig, Tarakeshwar, & Hahn, 2004; Pargament et al., 1998). Although negative religious coping was not significantly correlated with baseline, post-task, or cortisol reactivity, the direction of association was in the expected direction. However, negative religious coping was the only predictor variable in the regression analyses that significantly predicted indicators of psychological well-being including depression, state anxiety and trait anxiety. This finding supports previous research which has shown a negative relationship between negative religious coping and positive indicators of psychological well-being (Maltby & Day, 2003; Winter et al., 2009).

## Limitations and Suggestions for Future Research

A significant limitation in this study was in regard to the instrumentation used to elicit HPA Axis reactivity. This study employed a computerized stroop color-word test as a stress-inducing task under quasi-experimental conditions. While previous research has documented the efficacy of stroop color-word tests as an effective laboratory stressor (see Siska, 2002), other laboratory stressors have demonstrated greater effect sizes in eliciting the stress response. For example, a review by Dickerson and Kemeny (2004) of 208 laboratory studies of acute psychological stressors and cortisol reactivity concluded that employing a cognitive task such as the stroop color-word test as a laboratory stressor can be effective (Effect Size = .20); however, other laboratory stressors that incorporate uncontrollable and social-evaluative threat elements (performance that could be judged negatively by others) produce the largest cortisol response (Effect Size = .80). Future studies may want to consider using a more effective laboratory stressor such as the Trier Social Stress Test (Kirschbaum, Pirke, & Hellhammer, 1993) which incorporates both

uncontrollable and social-evaluative threat in its design. An alternative hypothesis is that because cortisol levels went down after exposure to acute stress, it may be that participants were already experiencing a degree of stress reactivity when they arrived for the study as a result of knowing they were about to participate in an experimental study in which they would experience 'stress'. Subjects' level of self-reported perceived stress was not assessed prior to beginning the quasi-experimental conditions, and a lack of how this may have impacted cortisol reactivity represents a notable study limitation.

A second major limitation of this study lies in the instrumentation used to assess certain elements of spirituality and religiosity. In an attempt to replicate Tataro et al.'s (2005), the investigator used the Brief Multidimensional Measure of Religiosity/Spirituality (BMMRS). Both overall religiosity and spirituality were assessed with a single item scale (i.e., 'To what extent do you consider yourself to be a religious [spiritual] person?'). This may be problematic due to its inability to tap into further dimensions and complexities that may comprise spirituality or religiosity. Although the use of single-item scales are sometimes favored over multi-items scales because of ease and practicality, this can pose serious issues related to reliability and proper theoretical grounding (Rossiter, 2002).

The difference in gender represented in this study represents another limitation. Women were represented in almost a 4 to 1 ratio compared to men and this may have impacted results related to gender differences. A study that had nearly an equal number of gender participants might better assess the potential for differences in religious approach and cortisol responses. This is an important issue to consider in future studies considering that studies continue to find different results related to cortisol responses and

gender specifically. Additionally, constricted range may have affected this sample due to using exclusively college students as subjects. Previous research has documented that college populations tend to be less religious than the general population (Pascarella & Terenzini, 1991). As a result, the lack of significance throughout this study may have been an artifact of the reported levels of religiosity and religious coping consistent with a 'less religious' population. Moreover, it should also be noted that this study had greater variability in baseline (*SD* = .20) and post-task (*SD* = .14) cortisol levels, in addition to composite religiosity/spirituality (*SD* = 25.4) scores on the BMMRS compared to Tataro et al. (2005). This variability may also have contributed to the non-significant findings. Finally, this study examined only one biomarker for stress reactivity (i.e., cortisol). Future studies may want to consider adding a second physiological marker such as blood pressure or galvanic skin response for comparing purposes against cortisol reactivity.

## Implications

Although there was a high prevalence of non-significant results in this study, a consistent finding was that negative religious coping was associated with poorer indicators of well-being. These results may suggest that negative approaches to faith may have more impact on psychological well-being than positive ones. As such, it would be important from a treatment standpoint to assess the presence and magnitude of negative religious coping patterns and their potential impact emotionally. As Ano and Vasconcelles (2005) suggest, understanding negative forms of religious coping may help mental health practitioners identify possible 'warning signs' or 'red flags' about how one's religion may serve as a resource or burden for them in the coping process.

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