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Religious Doubts and Sleep Quality: Findings from a Nationwide Study of Presbyterians

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Abstract

A growing literature examines the correlates and sequelae of spiritual struggles, such as religious doubts. To date, however, this literature has focused primarily on a handful of mental health outcomes (e.g., symptoms of depression, anxiety, negative affect), while the possible links with other aspects of health and well-being, such as poor or disrupted sleep, have received much less attention. After reviewing relevant theory and previous studies, we analyze data from a nationwide sample of Presbyterian Church (USA) members to test the hypothesis that religious doubts will be inversely associated with overall self-rated sleep quality, and positively associated with the frequency of sleep problems and the use of sleep medications. We also hypothesize that part of this association will be explained by the link between religious doubts and psychological distress. Results offer moderate but consistent support for these predictions. We end with a discussion of the implications of these findings, a brief mention of study limitations, and some suggestions for future research.

Keywords

Religion; Spiritual Struggle; Doubt; Health; Sleep

INTRODUCTION

Over the past two decades, a rapidly growing body of research has documented important links between religiousness and health (Koenig, McCullough & Larson, 2001). Although work in this area remains highly controversial in some quarters (e.g., Sloan, 2006), the weight of the evidence indicates that aspects of religious participation and commitment have salutary effects on a broad array of health outcomes, ranging from mental health (e.g., depression, subjective well-being), to physical health (e.g., hypertension, physical mobility), and even to mortality risk (Ellison & Levin, 1998, Hummer et al., 2004; Smith, McCullough, & Poll, 2003).

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To date, however, this work has virtually ignored possible links between religious involvement and sleep quality. This oversight is especially surprising in light of the mounting attention devoted to the importance of sleep problems among US adults. According to data collected by the National Sleep Foundation (2008), approximately 60% of US adults experience sleep problems a few nights per week or more, while more than 40% of adults experience daytime sleepiness that is severe enough to interfere with their activities at least a few days per month. Overall, the National Sleep Foundation estimates that more than 40 million Americans suffer from sleep disorders, most of which remain undiagnosed.

Sleep is increasingly recognized as a major factor affecting mental and physical health, worker productivity, and overall quality of life (Mezick et al., 2008; Moore et al, 2002; Naitoh, Kelly, & Englund, 1990). For example, periodic sleep deprivation can influence an individual's emotional well-being and ability to concentrate (Pilcher & Hunicutt, 1996; Pilcher & Walters, 1997), and long-term sleep loss has been linked with cardiovascular disease and mortality risk (Kojima et al., 2000; Schwartz et al., 1999). Good sleep quality, in contrast, has been associated with lower levels of psychological distress and better physical health (Barton et al., 1995; Bliwise, 1992; Shaver & Paulsen, 1993). Although few studies have directly compared the effects of sleep quality with those of sleep quantity, the available evidence suggests that the quality of sleep may be a stronger predictor of health outcomes (Moore et al., 2002; Pilcher, Ginter, & Sadowsky, 1997).

Although evidence links some sleep problems with social and environmental influences, much of this attention has centered on the role of sociodemographic factors such as age, sex, race, and socioeconomic status (Asplund, 1999; Gellis et al., 2005; Hall, Bromberger, & Mathews, 1999; Hoch et al., 1997; Mezick et al., 2008; Middelkoop et al., 1996; Moore et al., 2002). The possible role of religion has received short shrift in the research literature. In their comprehensive review of religion-health studies, *The Handbook of Religion and Health*, Koenig and colleagues (2001) were able to identify only one empirical study relating religion and sleep. In that study, Hoch et al. (1987) compared the sleep quality and duration of 10 cloistered Catholic nuns with the sleep experiences of 10 age-matched community-dwelling women, and reported that on average, the nuns enjoyed more prolonged, higher-quality sleep than their lay counterparts. More recently, Hill and colleagues (2006) found that regular attendance at religious services was positively associated with self-reported sleep quality (as well as other desirable health behaviors) in a statewide sample of Texas adults. Although both of these studies are interesting, each falls short of identifying the ways in which specific aspects of religious involvement may influence sleep quality among community-dwelling adults.

Moreover, although most work on religion and health has focused on salutary effects on health, there is now evidence that certain facets of religious engagement—termed “spiritual struggles”—can undermine health and well-being (Exline, 2002; Exline & Rose, 2005; Pargament, 2002). In one important discussion, Pargament and associates (2005) define spiritual struggles as “efforts to conserve or transform a spirituality that has been threatened or harmed” (247). Recent work in this tradition has highlighted several types of spiritual struggles, including the one examined here: religious doubting.

Despite the growing interest in these phenomena, few studies have examined the correlations among religious doubting and health and well-being. The majority of studies exploring religious doubts have focused on a relatively small range of health outcomes, e.g., symptoms of depression, anxiety, negative affect, and physical health status. To our knowledge, there is no body of existing research associating this aspect of religious life with sleep experiences. Our study addresses these gaps in the literature by outlining theoretical arguments linking religious doubts and sleep quality, and by testing these arguments using

data on a large nationwide sample of adult members of the Presbyterian Church (USA). Results are discussed in terms of their implications for future work linking religion, and particularly religious doubts and other types of spiritual struggles, with health behaviors and outcomes.

THEORETICAL AND EMPIRICAL BACKGROUND

For several decades, social scientists have recognized the complex, multidimensional character of religion, and a long tradition of research has focused on strategies for measuring individual-level variations in these diverse domains (Hill & Pargament, 2003). This work has paid particular dividends in the area of religion and health. Improved measurement of health-relevant aspects of religious involvement—such as congregational support, coping practices, religious meaning, etc.—has paved the way for significant advances in our understanding of “the religion-health connection” (Idler et al., 2003; Krause, 2008; Pargament et al., 2000). This literature has documented a broad array of salutary effects of religiousness on mental and physical health outcomes (Koenig et al., 2001; Smith & McCullough, 2003).

Although the role of religion as a source of solace and comfort has been well-established, religion can also be experienced in less satisfying, more troubling ways. Indeed, researchers have long recognized that certain aspects of religious life may undermine mental and physical well-being (e.g., Ellis, 1962). Within the past decade, an empirical literature on the correlates and sequelae of “spiritual struggles” has flourished (Exline & Rose, 2005; Pargament et al., 2005). Several types of spiritual struggle have received sustained attention in recent studies: interpersonal struggles, such as negative interactions in religious settings; divine struggles, or troubled relationships with God; and intrapsychic struggles, such as doubting and difficulties with maintaining religious faith. The available evidence indicates that spiritual struggles are generally less prevalent than positive manifestations of religiousness (Idler et al., 2003), although they surface more often among clinical samples as compared with samples of community-dwelling persons (Fitchett et al., 2004).

Religious doubting has received significant attention from social and behavioral scientists in recent years (Exline, 2002; Hunsberger et al., 1993, 2002; Krause & Ellison, 2009). Doubts or other nagging reservations about matters of faith can emerge from numerous sources, including the problem of evil, as believers struggle to understand why bad things happen, particularly to good people. Many persons also grapple with challenges posed by scientific developments, as well as a host of other issues concerning religious dogmas and institutional practices (Hecht, 2003). To be sure, some prominent theologians (e.g., Paul Tillich) and psychologists (e.g., Gordon Allport) have argued that doubt can play a constructive role, as a necessary precursor to spiritual growth and faith maturation (Krause et al., 1999). However, a growing body of evidence links unresolved doubts with a range of negative mental and physical health outcomes (Galek et al., 2007; Krause, 2006a; Krause et al., 1999; Krause & Wulff, 2004).

Doubting may have undesirable health implications for several reasons. To begin with, individuals facing doubts are deprived of a potentially valuable personal resource that can facilitate health and well-being. Coherent religious belief systems can shape one’s fundamental assumptions about the world and one’s place within it. Such religious plausibility structures often provide an organizing principle via which one conducts routine affairs, defines roles and performs responsibilities, and nurtures relationships. Thus, religious meaning systems may provide toolkits with which individuals make sense of daily events, major life changes, and traumatic crises (Berger, 1967; Ellison, 1991).

In addition, doubts may be experienced as stressors in their own right. A long tradition of Christian teaching excoriates persons who harbor doubts about their faith, and there are also scriptural injunctions against doubting (Krause et al., 1999). Clearly significant, religious doubting is non-normative within many faith communities, especially among active church members. For this reason, individuals who experience nagging intrapsychic spiritual struggles may be caught in a particularly difficult bind. They may encounter feelings of guilt and remorse over their uncertainty, and might even worry about divine judgment of their tepid faith. At the same time, they may also fear the negative reactions of church members, clergy, and others, and therefore may be reluctant to discuss their doubts openly. By remaining silent about their flagging faith, doubters are thus deprived of whatever informal social support might be available from other believers who have also wrestled with spiritual questions. Consequently, religious doubting can be an especially lonely and painful form of spiritual struggle (Krause et al., 1999).

Several empirical studies have assessed the links between religious doubts and health-related outcomes. In one of the earliest works in this area, Ellison (1991) showed that the absence of doubts—which he characterized as “existential certainty”—was positively associated with life satisfaction and happiness in a cross-sectional probability sample of US adults. Analyzing data on a sample of members of the Presbyterian Church (USA), Krause and associates (1999) found that religious doubts were linked with both positive and depressed affect (in opposite directions). In a nationwide prospective study of older adults, Krause (2006a) subsequently found that doubts predicted increases in feelings of psychological distress over the three-year study period. Although most of these studies have focused on indicators of affective well-being, there are two noteworthy exceptions. Using data from the US Congregational Life Study, Krause and Wulff (2004) showed that religious doubting was associated with lower levels of satisfaction with health, as well as higher levels of distress. More recently, Galek and colleagues (2007) examined data from a nationwide online survey, finding that religious doubts were positively related to symptoms of a number of mental health problems measured in the SA-45 instrument, including depression, anxiety, phobia, paranoia, and hostility.

Our study augments this small but growing literature linking religious doubts with health outcomes by focusing on sleep quality. Why might religious doubts undermine sleep quality? As we noted earlier, because religious faith provides a sense of meaning and purpose for many persons—i.e., addressing explanations of why we are here, how we should live, and what happens when we die—unresolved religious doubts may signal an existential crisis. Individuals dealing with this uncertainty about these fundamental questions may feel restless and worried, and may find it more difficult to deal with the demands of daily life and personal problems alike. In addition, individuals who experience religious doubts may be kept awake by feelings of guilt and remorse, recognizing that such doubts run counter to religious teachings. They may also feel disturbed by the disruption of social ties within the church, as they reduce their level of activity and investment in congregational life, and this may result in a loss of social support that otherwise could assist them in dealing with these issues. The negative thoughts and ruminations over this form of spiritual strain and its implications may give rise to feelings of psychological distress, including depressed affect and anxiety. It is also possible that religious doubts can result in feelings of powerlessness, hopelessness, worry and fear, which may in turn trigger the release of stress hormones (epinephrine and cortisol) that promote mental and physiological arousal (Espie, 2002; Hill, Burdette, & Hale, 2009; McEwen, 2006; Van Reeth, et al. 2000). Thus, we expect that religious doubts will be inversely associated with overall sleep quality, and positively associated with the incidence of sleep problems.

In order to evaluate the association between religious doubts and sleep quality, it is necessary to control for the potentially confounding roles of poor physical health and feelings of psychological distress, which are bound up with sleep problems (Breslau et al. 1996; Hamilton et al. 2007). In fact, we expect that these relationships will be at least partly explained by psychological distress and its relationships with religious doubts and sleep quality. Further, because religious involvement has been linked with health behaviors such as physical exercise and heavy drinking, which are also predictors of sleep quality, it will be important to adjust for these behavioral factors (e.g., Mezick et al., 2008). Finally, the potentially confounding effects of relevant sociodemographic characteristics (e.g., age, educational attainment, etc.) must also be taken into account (Gellis et al., 2005; Moore et al., 2002). In the remainder of this study we design and execute such an investigation.

DATA

We analyze data from a national panel survey conducted among representative samples of two populations affiliated with the Presbyterian Church (USA): (1) active elders (i.e., active members who have been ordained as an elder in a Presbyterian congregation and who are currently serving on the session, or governing board, of a Presbyterian congregation; and (2) other active members (i.e., all active members minus the subset of active elders). For convenience, these populations and samples derived from them are referred to simply as “elders” and “members” (or “rank-and-file members”).¹

Elders

Elders were sampled in a two-stage process. First, all congregations (N=11,019) were classified into strata based on region, race/ethnic composition, and size of the session. A sample of 400 congregations was then drawn, with the number in each stratum proportional to the number of elders currently serving on session in the congregation of that stratum. Random sampling was used within strata to select the specific congregations. Second, each selected congregation was contacted by mail and asked (a) to provide the names of all active elders if the session size was eight or fewer, or (b) to sample eight names by matching eight preassigned random numbers to a numbered list of the session, if the session size was larger than eight. In all, 206 congregations (51% of sample) cooperated, providing 1,471 names.

Members

The member sample was also drawn in two stages. First, congregations were allocated to strata based on region, race/ethnic composition, and membership size. Then a sample of 500 was drawn from the population of congregations, with the number selected in each stratum proportional to the membership total of the congregations in that stratum. Random sampling was used within strata. Second, sampled congregations were contacted by mail and asked to provide eight member names by matching eight preassigned random numbers to a numbered list of active members. In all 273 congregations (54% of the sample) cooperated, providing 1,892 names.

The individuals in each sample were mailed a questionnaire in the fall of 2005. A total of 1,163 elders (79% of sample) and 1,099 members (58% of sample) returned this screening survey. These respondents comprise the panel (Research Services, 2006). Panel respondents were then surveyed a total of 12 times over a three-year period. We use data on sociodemographic characteristics and religious involvement from the screening survey, and on spiritual struggles and sleep quality from the fifth wave, which was administered in January 2007. Because of attrition, the number of participants in each panel sample had

¹The panel includes a representative sample of another population, active ministers, but it is not included in the current analysis.

declined slightly by the fifth wave, as follows: (a) elders, 1,135, of whom 693 (61%) responded; and (b) members, 1,037, of whom 557 (53%) responded (Research Services, 2006).

MEASURES

Dependent Variables

Three items from the Pittsburgh Sleep Quality Inventory (Buysse et al., 1989) are used to measure sleep quality/problems. To measure overall self-rated sleep quality, respondents were asked: "During the past month, how would you rate your sleep quality overall?" Response categories range from 1 (very poor) to 4 (very good). To measure sleep problems, respondents were asked: "During the past month, how often have you had trouble sleeping because you cannot get to sleep within 30 minutes?" Response categories range from 1 (not in the past month) to 4 (three or more times a week). A question regarding medication use was also used to measure sleep problems. For this measure, respondents were asked: "How often do you use medications to help you get to sleep?" Response categories range from 1 (not in the past month) to 4 (three or more times a week). For each of these single-item ordinal measures, it is appropriate to employ ordered logistic regression estimation techniques (Powers and Xie 2000).

Independent Variable

Our key independent variable measures religious doubts. Respondents were asked: "How often have these problems caused doubts about your religious faith: (a) evil in the world, (b) conflict of faith and science, and (c) feeling that life really has no meaning." Answers range from 1 (never) to 3 (often), and our measure is based on the mean score on these items. Cronbach's alpha for this three-item measure, which has been used in several previous studies of links between doubting and well-being (Ellison, 1991; Galek et al., 2007; Krause et al., 1999), is .634. Although this measure of internal consistency reliability is somewhat low by conventional standards, it is similar to the alpha of doubting measures used in these previous studies, and we believe it is acceptable given that only three items make up the scale and that we are drawing on secondary data. The value of Cronbach's alpha often increases artificially as the number of items increases; the alpha is calculated according to the formula $NP/[1+P(N-1)]$, where N is equal to the number of items and P is equal to the average inter-item correlation.

Covariates

To control for the potential confounding effects of other aspects of religious involvement, and to strengthen our claims regarding the distinctive role of religious doubts, we include measures of several other aspects of religious life. To begin with, we take potential differences in religious commitment into account by including a dichotomous variable that distinguishes church elders (coded 1) from rank-and-file member (coded 0). The frequency of attendance at religious services is measured with a single-item question (coded 1 = never to 8 = every week): How often do you generally attend Sunday worship at your congregation? Frequency of prayer is also measured with a single item: Approximately how frequently do you pray privately? Response categories for this variable ranged from 1 = never to 7 = daily/almost daily. Secure attachment to God (Rowatt and Kirkpatrick, 2002) is measured with a mean index (alpha = .866) composed of the following six questions (coded 1 = not true to 7 = very true.): (a) God seems impersonal to me (reverse coded). (b) God seems to have little or no interest in my personal problems (reverse coded). (c) God seems to have little or no interest in my personal affairs (reverse coded). (d) I have a warm relationship with God. (e) God knows when I need support. and (f) I feel that God is generally responsive to me. Anxious attachment to God is measured with a mean index

constructed from the following three items ($\alpha = .698$), each of which was also coded 1 = not true to 7 = very true: (a) God sometimes seems responsive to my needs, but sometimes not. (b) God's reactions to me seem to be inconsistent. and (c) God sometimes seems very warm and other times very cold to me.

In addition, we include adjustments for several behavioral variables that have been linked with religious involvement and/or sleep quality. We control for strenuous exercise based on responses to the following question: On how many days in a typical week do you take part in strenuous activities like running, swimming, chopping wood, bicycling, lifting weights, playing tennis, or doing aerobics? Less vigorous exercise is measured with this item: In a typical week, on how many days do you engage in moderate exercise like playing golf, bowling, dancing, walking, working in the yard, or gardening for exercise? For each of these items, our measure is the number of days reported by the respondent. Alcohol consumption is measured via responses to the following question: In the past 30 days, what is the largest number of alcoholic drinks you have had in a single day? Recorded answers range from 0 to 7 or more drinks.

We also control for a number of stressful life events. Respondents were asked how many of the following events or conditions they experienced during the year preceding the survey: (a) Did your spouse, child, parent, grandparent, or grandchild die? (b) Did you suffer a major financial loss that involved 20% or more of your income? (c) Did your spouse, child, parent, grandparent, or grandchild suffer from a serious illness or accident? (d) Did you have a major disagreement with your spouse, child, parent, grandparent, or grandchild? (e) Did you have a major disagreement or serious argument with a close friend? (f) Did you experience any other major problem or challenge? Our measure is the number of stressful events reported by each respondent.

Sleep quality is also affected by mental and physical health problems, so we also include controls for these in our models. Psychological distress is measured using mean scores on an index composed of the following six questions, each of which was coded 1 = none of the time to 5 = all of the time (Cronbach's $\alpha = .816$): During the past 30 days, how much of the time did you feel... (a) so sad nothing could cheer you up; (b) nervous; (c) restless or fidgety; (d) hopeless; (e) that everything was an effort; and (f) worthless? (Kessler et al., 2002). To control for physical health, we employ a dummy variable where respondents who rated their health "fair" or "poor" are coded 1, and those who rated their health as "good" or "excellent" are coded 0.²

Our multivariate models also include controls for the following sociodemographic variables: age (measured in years); gender (1=female, 0=male); race/ethnicity (1=non-Hispanic white, 0=other); education (ordinal measure, 1=8th grade or less, 8=graduate or professional degree); and marital status (1=currently married, 0=all others). We also include adjustments for family income, measured as an ordinal variable, on which 1= less than \$10,000, and 16= \$250,000 or more. As is often the case in survey data, income contains a larger percentage of missing cases than other variables in our analyses (8.91%). Missing cases were imputed in order to avoid dropping these cases via listwise deletion. However, ancillary analyses (not shown, but available upon request) demonstrate that this does not affect our key findings.

²We recognize the possibility that the relationship between self-rated physical health and sleep quality may be bidirectional, i.e., that sleep quality may erode health just as poor health can undermine sleep quality. It is also conceivable that self-reported, subjective assessments of both sleep quality and overall health may be correlated due to common, unmeasured influences, including possible response biases. Nevertheless, we follow the lead of previous researchers (e.g., Moore et al., 2002) who incorporate adjustments for the potentially confounding effects of health status on indicators of sleep quality.

RESULTS

Descriptive statistics for all variables are provided in Table 1. Several patterns deserve brief mention. In this sample of PC(USA) church members, self-assessed sleep quality tends to be relatively high, and the incidence of most specific sleep problems and disruptions is limited. Nearly half of our sample reports having at least some religious doubts, although levels are relatively low (mean=1.305 on a 1–3 scale). This figure is quite consistent with estimates based on the NORC General Social Survey, a representative sample of US adults (Ellison and Lee 2010). Levels of psychological distress are also quite low (mean=1.529 on a 1–5 scale). Given the nature of this sample, it is not surprising that levels of traditional religious involvement are quite high compared to the general US population. The average respondent reports attending worship services weekly and praying at least once a day, and most respondents report being securely attached to God. In a typical week, the average respondent participates in strenuous exercise two days per week and moderate exercise on roughly three days, while tendencies toward heavy drinking are very limited in this sample. Likewise, the occurrence of stressful life events is relatively low among our respondents. Only a small proportion of respondents (around 14%) report having fair or poor health. The average respondent is in late middle-age, and possesses a relatively high level of education (a bachelor's degree) and family income (\$70,000–79,999 per year). Women slightly outnumber men, respondents are overwhelmingly non-Hispanic white, and approximately three-fourths are married.

Table 2 shows zero-order correlations among our three sleep quality measures, religious doubts, and psychological distress. There are moderate correlations between each of the sleep quality outcomes (r 's range from .234 to $-.475$). Religious doubts bear modest, yet statistically significant, correlations with each of the aspects of sleep quality examined here (r 's range from .090 to .155). Psychological distress is moderately correlated with each of the measures of sleep quality (r 's range from .174 to $-.369$), as well as religious doubts ($r=$.231). This provides preliminary support for our hypotheses.

Table 3 presents results of a series of ordered logistic regression models, estimating the net effects of religious doubts and covariates on three indicators of sleep quality: (a) overall self-reported sleep quality; (b) frequency with which R cannot fall asleep within 30 minutes; and (c) frequency with which R takes medications to help with sleep. Because the outcome measures are ordinal, ranging from 1–4, ordered logistic regression is the appropriate analytic technique. For each outcome, two models are displayed; in the first of these, the association between religious doubt and sleep quality is estimated without controlling for psychological distress, while the second model includes an adjustment for distress. Model 1 reveals that each one-unit increment in religious doubts is associated with a reduction of roughly 46% ($OR=.539$, $p<.001$) in the cumulative odds of overall self-reported sleep quality. When distress is included as a control in model 2, (a) distress is a strong inverse predictor of sleep quality ($OR=.256$, $p<.001$), and (b) the estimated net effect of doubts is diminished but not eliminated. Even in this second model, each one-unit increase in religious doubting is associated with a 32% decline ($OR=.680$, $p<.05$) in the cumulative odds of self-reported sleep quality. Turning to model 3, we find that each one-unit change in religious doubts is associated with an increase of approximately 100% ($OR=2.006$, $p<.001$) in the cumulative odds of reporting difficulty falling asleep within 30 minutes. In model 4, psychological distress once again emerges as a strong predictor of poorer sleep ($OR=2.919$, $p<.001$). The magnitude of the estimated net effect of religious doubting is reduced in model 4, as compared with model 3, but it remains a robust predictor of sleep difficulty ($OR=1.611$, $p<.01$). In model 5 each one-unit increase in religious doubts is related to an increase of approximately 85% ($OR=1.858$, $p<.001$) in the cumulative odds of using medications to help with sleep. As with the other outcomes examined here, we find that

distress is a positive predictor of the need for sleep aids in model 6 (OR=1.925, $p<.001$), and that controlling for distress diminishes—but does not eliminate—the estimated net effect of religious doubts on this outcome (OR=1.576, $p<.05$).

Given the dearth of information about the social patterning of sleep quality in community-dwelling samples, the estimated net effects of several covariates also deserve mention. Aspects of religious life other than doubts are not very predictive of sleep quality, with the lone exception being a positive association between prayer and overall self-rated sleep quality. Moderate exercise is positively associated with overall self-rated sleep quality, and inversely associated with the use of sleep medications. Alcohol consumption is associated only with the use of medications. Stressful life events bear a strong positive association with the frequency of sleep problems, while psychological distress and fair/poor physical health are positively associated with frequency of sleep problems, not being able to get to sleep within 30 minutes, and using sleep medications, as well as inversely associated with overall sleep quality. Age is positively associated with the frequency of sleep problems as measured by our indexed measure, as well as with the use of medications to help get to sleep. Education, on the other hand, is inversely associated with both of these outcomes.

DISCUSSION

The links between religious involvement and sleep quality are woefully understudied. To address this shortcoming in the literature, our work investigates the relationships between one specific domain of spiritual struggle—religious doubting—and three indicators of sleep quality using data on a nationwide sample of Presbyterian (PCUSA) church members. To our knowledge, this study is the first of its kind, and our results confirm several robust associations between religious doubts and poor sleep quality. These associations persist despite controls for an array of sociodemographic and behavioral covariates, including age, mental and physical health, stressful life events, attendance at religious services, frequency of prayer, and attachment to God. Therefore, these results contribute to an emerging empirical literature addressing the correlates and consequences of religious doubt (e.g., Ellison and Lee, 2010; Hunsberger et al., 1993, 2002; Krause & Ellison, 2009). Clarifying the mechanisms or pathways linking religious doubting with poor sleep quality and other mental and physical health outcomes should be a priority for researchers in the future.

What factors might account for the observed link between religious doubts and poor or disrupted sleep? Individuals who experience difficulties in embracing religious doctrines or worldviews may be deprived of a key source of coherence and meaning in their lives. This loss of a religious “plausibility structure,” or orienting framework via which to interpret, and assign significance to, mundane affairs and personal traumas, could generate or amplify existential uncertainty (Berger, 1967; Ellison, 1991). Because it is often stigmatized within religious traditions and communities, religious doubt itself may be a source of stress. Individuals may feel guilt, shame and other negative emotions in response to this counternormative experience. They may also be reluctant to acknowledge their doubts to others, and thus may be deprived of an important source of potential support—i.e., spiritual and emotional assistance from church members—that could be helpful in their struggles (Krause et al., 1999). Our results suggest that part, but certainly not all, of the link between religious doubts and sleep quality may be due to heightened psychological distress. However, even with statistical adjustments for distress, robust associations remain to be explained. Physiological pathways may offer promising candidates for this purpose. For example, religious doubts, and the negative emotions they engender, may lead to the release of stress hormones, which can elevate mental and physiological arousal and thus may make states of relaxation and sleep more difficult to attain (Espie, 2002; Van Reeth et al., 2000).

The results of this study suggest several additional directions for future inquiry. First, although it is important to focus on spiritual struggles and their consequences, additional work is also needed on other aspects of religiousness and spirituality, and their potentially salutary effects on sleep quality. Examples of such religious domains include: positive religious coping styles (Pargament et al. 2000); congregational support processes, particularly anticipated support from church members (Krause, 2008); and religious meaning and gratitude toward God (Krause, 2003, 2006b); and others. A growing literature links these religious constructs with a range of desirable mental and physical health outcomes, and it would be useful to examine their associations with sleep experiences as well.

Second, an important segment of the religion-health literature explores the interrelationships between religious involvement, social stressors (i.e., major life events and traumas, chronic strains), and health and well-being (Ellison et al., 2001; Fabricatore et al., 2004). Although religiousness and spirituality tend to have salutary effects on mental and physical health for individuals in general, they may be particularly valuable for the well-being of persons who are experiencing high levels of stress. Religious coping practices, social support, and other resources (e.g., meaning, gratitude) can moderate, or buffer, the deleterious effects of problematic events and conditions on health outcomes. Future studies on religious resources and sleep quality should therefore begin investigating whether aspects of religiousness may reduce the impact of chronic or acute stressors on individuals' sleep experiences.

Third, although we have explored intrapsychic spiritual struggle, in the form of religious doubting, theorists and researchers have identified several other important domains of strain or struggle (Exline & Rose, 2005; Pargament et al., 2005). For example, a substantial body of work now links divine struggle, or troubled relationships with God, to negative mental and physical health outcomes, even including mortality risk in one clinical sample (e.g., Pargament et al., 2001, 2004). Further, a growing literature associates interpersonal struggles, i.e., negative interactions in religious settings, with undesirable health sequelae (e.g., Krause, 2008). In addition, a long tradition of theory warns about potential psychosocial damage that could result from the doctrine of original sin, a predominantly Christian notion that all individuals are born sinful, i.e., inclined toward selfishness, rebellion, and evil (Ellis, 1962; Musick, 2000). Exline (2002) also points to the struggle for self-control, and the challenges of cultivating virtue—along with the challenge of self-forgiveness for those who succumb to the temptations of vice—as yet another form of spiritual struggle. Future studies might profitably explore these and other facets of the complex and variegated domain of spiritual struggle and their implications for sleep experiences and other relevant outcomes.

Fourth, future investigators might profitably examine the role of sleep experiences in mediating the well-documented connection between religious involvement and mental and physical health outcomes. Briefly, researchers have begun to consider sleep (both quality and quantity) as one component of the explanation for socioeconomic status (SES) differentials in health (Mezick et al., 2008; Moore et al., 2002). Among other works, these studies draw upon findings that inadequate sleep is associated with physiological changes (e.g., decreased glucose tolerance, elevated cortisol levels) that parallel changes that are observed in aging (Van Cauter & Spiegel, 1999). Perhaps such processes also connect religious involvement, sleep quality, and health. While spiritual struggles have been linked with various negative health outcomes (Krause & Wulff, 2004; Pargament et al., 2001, 2004), positive aspects of religiousness and spirituality have been associated with salutary health outcomes, including reduced mortality risk (Hummer et al., 2004; Koenig et al., 2001). Thus, investigators should explore whether variations in sleep experiences may help

to account for the disparate health effects of spiritual struggles and religious resources, respectively. Such research might clarify at least one part of the religion-health connection.

This study is characterized by several significant limitations that deserve mention. For example, both religious doubts and sleep quality are assessed via self-reports. Although such self-report data are clearly of interest to the health community, and have been shown to correlate with biomarkers of sleep experience that are measured in clinical and laboratory settings, given the evidence that self-reports are partly influenced by social desirability bias it will be important to replicate these findings with more precise clinical measures of sleep quality and disruption. More broadly, as Moore and colleagues (2002) have pointed out, it may be useful to compare the results across three types of sleep indices: (a) physiological (e.g., brain-wave activity, hormone levels); (b) behavioral (e.g., total sleep time, number of arousals); and (c) psychological (e.g., sleep satisfaction, exhaustion).

Three other limitations also deserve mention. Our study is based on cross-sectional survey data, which lacks information on the temporal ordering or duration of either spiritual struggles or sleep quality. Thus, it is conceivable that sleep problems may precede religious doubts, and that such religious struggles are at least partly products of the dysphoria or cognitive deficits brought on by disrupted sleep. Longitudinal data—ideally more than two waves—are needed to see how these two constructs (spiritual struggles and sleep quality) covary together, and whether reductions in spiritual struggle may portend improvements in sleep experiences. In addition, our study uses data on a sample of persons drawn from a single denomination, the Presbyterian Church (U.S.A.). Given the religious and sociodemographic distinctiveness of the population from which this sample was drawn (i.e., older, above-average SES, and primarily non-Hispanic whites with above-average levels of conventional religiousness), we cannot generalize our findings beyond this particular group to the broader US adult population. Thus, it will be important for researchers to replicate these findings with other, more diverse and representative, samples, and to explore subgroup variations (e.g., by race/ethnicity, SES, etc.) in the links between religion and sleep quality. Third, the measure of religious doubts used in this study is somewhat limited in its scope and reliability. Future research should seek to develop better measures of religious doubt. Given these limitations, our findings may actually underestimate the relationships between doubts, psychological distress, and sleep quality. Thus, future studies should develop and use alternative measures of religious doubt that surmount these difficulties, perhaps building on recent work by Krause and colleagues (e.g., Krause and Wulff 2004; Krause and Ellison 2009).

Despite these limitations, we believe that the present study has made a useful and original contribution to the links between religious involvement and a major, hitherto neglected, domain of health: sleep quality. Given the growing public consciousness of sleep problems and their toll on individuals, families, and society, future research along the lines indicated above promises to cast additional light on religious influences on, and variations in, sleep experiences and other health behaviors and outcomes.

References

- Asplund, Ragnar. Sleep Disorders in the Elderly. *Drugs and Aging*. 1999; 14:91–103. [PubMed: 10084363]
- Barton J, Spelten E, Totterdell P, Smith L. Is There an Optimum Number of Night Shifts? Relationship Between Sleep, Health, and Well-Being. *Work and Stress*. 1995; 9:109–123. [PubMed: 11539389]
- Bliwise, Nancy G. Factors Related to Sleep Quality in Healthy Elderly Women. *Psychology and Aging*. 1992; 7:83–88. [PubMed: 1558709]

- Breslau, Naomi; Roth, Thomas; Rosenthal, Leon; Andreski, Patricia. Sleep Disturbance and Psychiatric Disorders: A Longitudinal Study of Young Adults. *Biological Psychiatry*. 1996; 39:411–418. [PubMed: 8679786]
- Burker, Eileen J.; Evon, Donna M.; Sedway, Jan A.; Egan, Thomas. Religious Coping, Psychological Distress, and Disability among Patients with End-Stage Pulmonary Disease. *Journal of Clinical Psychology in Medical Settings*. 2004; 11:179–193.
- Buyse, Daniel J.; Reynolds, Charles F., III; Monk, Timothy H.; Berman, Susan R.; Kupfer, David J. The Pittsburgh Sleep Quality Index: A New Instrument for Psychiatric. *Practice and Research*. 1989; 28:193–213.
- Ellis, Albert L. Reason and Emotion in Psychotherapy. Secaucus, NJ: Lyle Stuart; 1962.
- Ellison, Christopher G. Religious Involvement and Subjective Well-Being. *Journal of Health and Social Behavior*. 1991; 32:80–99. [PubMed: 2007763]
- Ellison, Christopher G.; Boardman, Jason D.; Williams, David R.; Jackson, James S. Religious Involvement, Stress, and Mental Health: Findings from the 1995 Detroit Area Study. *Social Forces*. 2001; 80:215–249.
- Ellison, Christopher G.; Lee, Jinwoo. Spiritual Struggles and Psychological Distress among US Adults: Is There a Dark Side of Religion? *Social Indicators Research*. 2010
- Ellison, Christopher G.; Levin, Jeffrey S. The Religion-Health Connection: Evidence, Theory, and Future Directions. *Health Education and Behavior*. 1998; 25:700–720. [PubMed: 9813743]
- Espie, Colin A. Insomnia: Conceptual Issues in the Development, Persistence, and Treatment of Sleep Disorder in Adults. *Annual Review of Psychology*. 2002; 53:215–243.
- Exline, Julia J. Stumbling Blocks on the Religious Road: Fractured Relationships, Nagging Vices, and the Inner Struggle to Believe. *Psychological Inquiry*. 2002; 13:182–189.
- Exline, Julia J.; Rose, E. Religious and Spiritual Struggles. In: Paloutzian, Raymond F.; Park, Crystal L., editors. *Handbook of the Psychology of Religion*. New York: Guilford; 2005.
- Fabricatore, Anthony N.; Handal, Paul J.; Rubio, Doris M.; Gilner, Frank H. Stress, Religion, and Mental Health: Religious Coping in Mediating and Moderating Roles. *International Journal for the Psychology of Religion*. 2004; 14:91–108.
- Fitchett, George; Murphy, Patricia E.; Kim, Jo; Gibbons, James L.; Cameron, Jacqueline R.; Davis, Judy A. Religious Struggle: Prevalence, Correlates, and Mental Health in Diabetic, Congestive Heart Failure, and Oncology Patients. *International Journal for Psychiatry in Medicine*. 2004; 34:179–196.
- Galek, Kathleen C.; Krause, Neal; Ellison, Christopher G.; Kudler, Taryn; Flannelly, Kevin J. Religious Doubt and Mental Health Across the Lifespan. *Journal of Adult Development*. 2007; 14:16–25.
- Gellis, Les A.; Lichstein, Kenneth L.; Scarinci, Isabel C.; Health Durrance, H.; Taylor, Daniel J.; Bush, Andrew J.; Riedel, Brant W. Socioeconomic Status and Insomnia. *Journal of Abnormal Psychology*. 2005; 114:111–118. [PubMed: 15709817]
- Hall, Martica; Bromberger, Joyce; Matthews, Karen. Socioeconomic Status as a Correlate of Sleep in African American and Caucasian Women. *Annals of the New York Academy of Sciences*. 1999; 896:427–430. [PubMed: 10681942]
- Hamilton N, Nelson C, Stevens N, Kitzman Heather. Sleep and Psychological Well-Being. *Social Indicators Research*. 2007; 82:147–163.
- Hecht, Jennifer M. *Doubt: A History*. San Francisco: Harper and Row; 2003.
- Hill, Peter C.; Pargament, Kenneth I. Advances in the Conceptualization and Measurement of Religion and Spirituality. *American Psychologist*. 2003; 58:64–74. [PubMed: 12674819]
- Hill, Terrence D.; Burdette, Amy M.; Ellison, Christopher G.; Musick, Marc A. Religious Attendance and the Health Behaviors of Texas Adults. *Preventive Medicine*. 2006; 42:309–312. [PubMed: 16445971]
- Hill, Terrence D.; Burdette, Amy M.; Hale, Lauren. Neighborhood Disorder, Sleep Quality, and Psychological Distress: Testing a Model of Structural Amplification. *Health and Place*. 2009; 15:1006–1013. [PubMed: 19447667]
- Hoch, Carolyn C.; Dew, Mary Amanda; Reynolds, Charles F., III; Buysse, Daniel J.; Nowell, Peter D.; Monk, Timothy J.; Mazumdar, Sati; Borland, Michael D.; Miewald, Jean; Kupfer, David J.

- Longitudinal Changes in Diary- and Laboratory-Based Sleep Measures in Healthy “Old Old” and “Young Old” Subjects: A Three-year Follow-up. *Sleep*. 1997; 20:192–202. [PubMed: 9178915]
- Hoch, Carolyn C.; Reynolds, Charles F., III; Kupfer, David J.; Houck, Patricia R.; Berman, Susan R.; Stack, Jacqueline A. The Superior Sleep of Healthy Elderly Nuns. *International Journal of Aging and Human Development*. 1987; 25:1–9. [PubMed: 3429036]
- Hummer, Robert A.; Ellison, Christopher G.; Rogers, Richard G.; Moulton, Benjamin E.; Romero, Ron R. Religious Involvement and Adult Mortality: Review and Perspective. *Southern Medical Journal*. 2004; 97:1223–1230. [PubMed: 15646761]
- Hunsberger, Bruce; McKenzie, B.; Pratt, Michael; Mark Pancer, S. Religious Doubt: A Social Psychological Analysis. *Research in the Scientific Study of Religion*. 1993; 5:27–51.
- Hunsberger, Bruce; Pratt, Michael; Mark Pancer, S. A Longitudinal Study of Religious Doubt in High School and Beyond: Relationships, Stability, and Looking for Answers. *Journal for the Scientific Study of Religion*. 2002; 41:255–266.
- Idler, Ellen L.; Musick, Marc A.; Ellison, Christopher G.; George, Linda K.; Krause, Neal; Ory, Marcia; Pargament, Kenneth; Powell, Lynda H.; Underwood, Lynn G.; Williams, David R. Measuring Multiple Dimensions of Religion and Spirituality for Health Research: Conceptual Background and Findings from the 1998 General Social Survey. *Research on Aging*. 2003; 25:327–366.
- Kessler RC, Andrews G, Colpe LJ, Hiripi E, Mroczek DK, Normand SLT, Waters EE, Zaslavsky AM. Short Screening Scales to Monitor Population Prevalences and Trends in Non-Specific Psychological Distress. *Psychological Medicine*. 2002; 32:959–976. [PubMed: 12214795]
- Koenig, Harold G.; McCullough, Michael E.; Larson, David B. *Handbook of Religion and Health*. New York: Oxford University Press; 2001.
- Kojima, Masayo; Wakai, Kenji; Kawamura, Takashi; Tamakoshi, Akiko; Aoki, Rie; Lin, Yingsong; Nakayama, Toshiko; Horibe, Hiroshi; Aoki, Nobuo; Ohno, Yoshiyuki. Sleep Patterns and Mortality: A 12-year Follow-up Study in Japan. *Journal of Epidemiology*. 2000; 10:87–93. [PubMed: 10778032]
- Krause, Neal. Religious Meaning and Subjective Well-Being in Late Life. *Journal of Gerontology: Social Sciences*. 2003; 58B:S160–S170.
- Krause, Neal. Religious Doubt and Psychological Well-Being: A Longitudinal Investigation. *Review of Religious Research*. 2006a; 47:287–302.
- Krause, Neal. Gratitude Toward God, Stress, and Health in Late Life. *Research on Aging*. 2006b; 28:163–183.
- Krause, Neal. *Aging in the Church: How Social Relationships Affect Health*. West Conshohocken, PA: John Templeton Foundation Press; 2008.
- Krause, Neal; Ellison, Christopher G. The Doubting Process: A Longitudinal Study of the Precipitants and Consequences of Religious Doubt. *Journal for the Scientific Study of Religion*. 2009; 48:293–312. [PubMed: 20300487]
- Krause, Neal; Ingersoll-Dayton, Berit; Ellison, Christopher G.; Wulff, Keith M. Aging, Religious Doubt, and Psychological Well-Being. *The Gerontologist*. 1999; 39:525–533. [PubMed: 10568077]
- Krause, Neal; Wulff, Keith M. Religious Doubt and Health: Exploring the Potential Dark Side of Religion. *Sociology of Religion*. 2004; 65:35–56.
- McEwen, Bruce. Protective and Damaging Effects of Stress Mediators: Central Role of the Brain. *Dialogues in Clinical Neuroscience*. 2006; 8:367–381. [PubMed: 17290796]
- Mezick, Elizabeth J.; Matthews, Karen A.; Strollo, Patrick J., Jr; Buysse, Daniel J.; Kamarck, Thomas W.; Owens, Jane F.; Reis, Steven E. Influence of Race and Socioeconomic Status on Sleep: The Pittsburgh SleepSCORE Project. *Psychosomatic Medicine*. 2008; 70:410–416. [PubMed: 18480189]
- Middlekoop, Huub; Smilde-van den Doel, Dini A.; Neven, Arie Kniustingh; Kamphuisen, Hilbert AC.; Springer, Chiel P. Subjective Sleep Characteristics of 1,485 Males and Females Aged 50–93: Effects of Sex and Age, and Factors Related to Self-Evaluated Quality of Sleep. *Journal of Gerontology: Medical Sciences*. 1996; 51A:M108–M115.

- Moore, Philip J.; Adler, Nancy E.; Williams, David R.; Jackson, James S. Socioeconomic Status and Health: The Role of Sleep. *Psychosomatic Medicine*. 2002; 64:337–344. [PubMed: 11914451]
- Musick, Marc A. Theodicy and Life Satisfaction among Black and White Americans. *Sociology of Religion*. 2000; 61:267–287.
- Naitoh, Paul; Kelly, TL.; Englund, Carl E. Health Effects of Sleep Deprivation. *Occupational Medicine*. 1990; 5:209–237. [PubMed: 2203156]
- National Sleep Foundation. The Importance of Sleep. 2008. <http://www.sleepfoundation.org>; retrieved 8/17/08
- Pargament, Kenneth I. The Bitter and the Sweet: An Evaluation of the Costs and Benefits of Religiousness. *Psychological Inquiry*. 2002; 13:168–181.
- Pargament, Kenneth I.; Koenig, Harold G.; Perez, Lisa M. The Many Methods of Religious Coping: Development and Initial Validation of the RCOPE. *Journal of Clinical Psychology*. 2000; 56:519–543. [PubMed: 10775045]
- Pargament, Kenneth I.; Koenig, Harold G.; Tarakeshwar, Nalini; Hahn, June. Religious Struggle as a Predictor of Mortality among Medically Ill Elderly Patients. *Archives of Internal Medicine*. 2001; 161:1881–1885. [PubMed: 11493130]
- Pargament, Kenneth I.; Koenig, Harold G.; Tarakeshwar, Nalini; Hahn, June. Religious Coping Methods as Predictors of Psychological, Physical, and Spiritual Outcomes among Medically Ill Elderly Patients: A Two-year Longitudinal Study. *Journal of Health Psychology*. 2004; 9:713–730. [PubMed: 15367751]
- Pargament, Kenneth I.; Murray-Swank, Nicole; Magyar, Gina M.; Ano, Gene G. Spiritual Struggle: A Phenomenon of Interest to Psychology and Religion. In: Miller, WR.; Delaney, HD., editors. *Judeo-Christian Perspectives on Psychology: Human Nature, Motivation, and Change*. Washington: American Psychological Association; 2005. p. 245-268.
- Pilcher, June J.; Ginter, Douglas R.; Sadowsky, Brigitte. Sleep Quality versus Sleep Quantity: Relationships Between Sleep and Measures of Health, Well-Being, and Sleepiness in College Students. *Journal of Psychosomatic Research*. 1997; 42:583–596. [PubMed: 9226606]
- Pilcher, June J.; Hunnicut, Allen I. Effects of Sleep Deprivation on Performance: A Meta-Analysis. *Sleep*. 1996; 19:318–326. [PubMed: 8776790]
- Pilcher, June J.; Walters, Amy S. How Sleep Deprivation Affects Psychological Variables Related to College Students' Cognitive Performance. *Journal of American College Health*. 1997; 46:121–126. [PubMed: 9394089]
- Powers, Daniel A.; Xie, Yu. *Statistical Methods for Categorical Data*. San Diego: Academic Press; 2000.
- Research Services, Presbyterian Church (USA). Religious and Demographic Profile of Presbyterians, 2005: Findings from the Initial Survey of the 2006–2008 Presbyterian Panel. Louisville: Research Services; 2006.
- Schwartz, Skai; McDowell Anderson, W.; Cole, Stephen R.; Cornoni-Huntley, Joan; Hays, Judith C.; Blazer, Daniel G. Insomnia and Heart Disease: A Review of Epidemiologic Studies. *Journal of Psychosomatic Research*. 1999; 47:313–333. [PubMed: 10616226]
- Shaver, Joan LF.; Paulsen, Virginia M. Sleep, Psychological Distress, and Somatic Symptoms in Perimenopausal Women. *Family Practice Research Journal*. 1993; 13:373–384. [PubMed: 8285088]
- Sloan, Richard P. *Blind Faith: The Unholy Alliance of Religion and Medicine*. New York: St. Martin's Press; 2006.
- Smith, Timothy P.; McCullough, Michael E.; Poll, Justin. Religiousness and Depression: Evidence for a Main Effect and the Moderating Influence of Stressful Life Events. *Psychological Bulletin*. 2003; 129:614–636. [PubMed: 12848223]
- Van Cauter, Eve; Spiegel, Karine. Sleep as a Mediator of the Relationship Between Socioeconomic Status and Health: A Hypothesis. *Annals of the New York Academy of Sciences*. 1999; 896:254–261. [PubMed: 10681902]
- Van Reeth O, Weibel L, Spiegel K, Leproult R, Dugovic C, Maccari S. Interactions Between Stress and Sleep: From Basic Research to Clinical Situations. *Sleep Medicine Reviews*. 2000; 4:201–219.

Table 1

Descriptive Statistics

	Mean	Std.Dev.	Range
Overall Self-Rated Sleep Quality	3.147	0.667	1–4
Cannot Sleep Within 30 Minutes	1.829	0.995	1–4
Take Sleep Medications	1.457	0.940	1–4
Religious Doubts	1.305	0.386	1–3
Psychological Distress	1.529	0.505	1–5
Church Elder	0.434	-	0–1
Religious Attendance	6.992	1.157	1–8
Prayer	6.392	1.227	1–7
Secure Attachment to God	5.923	1.041	1–7
Anxious Attachment to God	2.675	1.276	1–7
Strenuous Exercise	1.833	1.904	0–7
Moderate Exercise	3.145	1.987	0–7
Drinking	1.606	1.519	0–7
Stressful Life Events	0.158	0.180	0–1
Fair or Poor Health	0.138	-	0–1
Age	59.467	13.483	18–92
Sex (Female=1)	0.556	-	0–1
Race (White=1)	0.970	-	0–1
Education	6.051	1.739	1–8
Marital Status (Married=1)	0.786	-	0–1
Income	8.974	3.445	1–16

Notes: N=1034

Table 2

Zero-Order Correlations Among Key Study Variables

	Overall Self-Rated Sleep Quality	Cannot Sleep Within 30 Minutes	Take Sleep Medications	Religious Doubts	Psychological Distress
Overall Self-Rated Sleep Quality	1.000				
Cannot Sleep Within 30 Minutes	-0.475	1.000			
Take Sleep Medications	-0.257	0.234	1.000		
Religious Doubts	-0.148	0.155	0.090	1.000	
Psychological Distress	-0.369	0.311	0.174	0.231	1.000

Notes: N=1034; All correlations are significant at $p < 0.01$ or less

Table 3
Parameter Estimates from the Regression of Religious Doubts and Covariates on Three Measures of Sleep Quality/Problems

	Overall Self-Rated Sleep Quality			Cannot Sleep Within 30 Minutes			Take Sleep Medications		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6			
Religious Doubts	0.539 ***	0.680 *	2.006 ***	1.611 **	1.858 ***	1.576 *			
Psychological Distress	-	0.256 ***	-	2.919 ***	-	1.925 ***			
Church Elder	1.017	1.020	0.937	0.950	1.428 *	1.450 **			
Religious Attendance	1.110 +	1.103 +	0.957	0.969	1.026	1.036			
Prayer	1.090	1.158 *	1.040	0.996	1.026	0.993			
Secure Attachment to God	0.987	0.949	1.035	1.067	0.937	0.962			
Anxious Attachment to God	0.968	1.020	1.077	1.042	0.982	0.966			
Strenuous Exercise	1.052	0.709	0.997	1.004	0.995	0.994			
Moderate Exercise	1.089	1.086 **	0.979	0.985	0.901 **	0.908 **			
Drinking	0.981	0.983	0.990	0.989	1.109 +	1.122 **			
Stressful Life Events	0.281 ***	0.709	1.222	0.509 +	3.658 ***	2.207 +			
Fair or Poor Health	0.303 ***	0.392 ***	1.992 ***	1.553 **	1.716 **	1.485 *			
Age	1.007	1.001	0.996	1.001	1.022 ***	1.026 ***			
Sex (Female=1)	0.963	1.001	1.100	1.107	1.315 +	1.347 +			
Race (White=1)	1.309	1.478	0.698	0.598	0.765	0.715			
Education	1.006	1.013	0.901 **	0.895 **	1.009	1.002			
Marital Status (Married=1)	0.979	0.859	0.677 *	0.736 +	1.162	1.226			
Income	0.974	0.974	0.975	0.973	0.983	0.986			
Pseudo R2	.062	0.103	.034	.058	.036	.047			

Notes: N=1034. Cell entries are odds ratios from ordered logistic regression

+ p<.10

* p<.05

** p<.01

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