Sleep Quality and the Stress-Buffering Role of Religious Involvement: A Mediated Moderation Analysis

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*Although several studies have documented an inverse association between stressful events and sleep quality, much less is known about the factors that might moderate or buffer against the adverse effects of psychosocial stress on sleep. Building on previous research, we employ national cross-sectional survey data from the 2017 Baylor Religion Survey (*n= 1,410*) to test whether the association between recent stressful events and sleep quality varies according to several dimensions of religious involvement. We also formally assess whether any attenuation of the association between stressful events and sleep quality is at least partially mediated or explained by lower levels of depressive symptoms (mediated moderation). Our moderation analyses indicate that the inverse association between stressful events and sleep quality is in fact attenuated by religious cognitions (secure attachment to God and assurance of salvation), but not religious attendance or private religiousness. We also observe direct evidence of mediated moderation through depressive symptoms for both religious cognitions. Taken together, our results demonstrate that religious cognitions may buffer against stress-related sleep disturbance by helping people avoid symptoms of depression.*

Keywords: stress, sleep, depression, religion, religious beliefs, attachment to God, afterlife.

INTRODUCTION

A growing body of work in multiple disciplines has demonstrated the importance of sleep quality for a range of health outcomes. Briefly, sleep quality encompasses both quantitative (e.g., duration and latency) and qualitative (e.g., depth and soundness) aspects of sleep (Pilcher, Ginter, and Sadowsky 1997). Unfortunately, optimal sleep remains elusive for many people, typically due to insomnia, sleep apnea, restless legs syndrome, and other forms of sleep disruption. Such difficulties with sleep have been linked with an array of complications, including but not limited to cardiovascular and circulatory dysfunction, obesity and diabetes, affective disorder, and reduced life expectancy (Davies et al. 2014; Grandner et al. 2010; Riemann, Berger, and Voderholzer 2001). Sleep problems have also been shown to impair cognitive functioning, thereby limiting work and academic performance and increasing the risk of accidents, as well as to undermine interpersonal and familial relationships (Engle-Friedman et al. 2003; Williamson and Feyer 2000).

Given the far-reaching effects of suboptimal sleep, numerous studies have explored the epidemiology of sleep-related outcomes according to various social and behavioral factors, including age, gender, race-ethnicity, socioeconomic status, substance use, and exercise (Grandner et al.

2016; Hoch et al. 1997; Mezick et al. 2008; Middlekoop et al. 1996). One particularly robust predictor of impaired sleep is psychosocial stress (Kim and Dimsdale 2007). Indeed, major life events and chronic conditions can take a significant toll on sleep (Hale, Hill, and Burdette 2010; Mai et al. 2018; Williamson et al. 1995). Consequently, researchers have worked to identify factors that may mitigate the effects of psychosocial stress on sleep outcomes, such as social support and coping skills, among others (Morin, Rodrigue, and Ivers 2003).

One avenue of research that has received surprisingly little attention is whether religious involvement is linked with sleep. In fact, a recent review identified only seven population-based studies that explore associations between religious factors and sleep outcomes (Hill, DeAngelis, and Ellison 2018).[1] This general pattern of neglect contrasts sharply with the burgeoning theoretical and empirical literature on religion and other mental and physical health outcomes, including mortality risk (Hill, Burdette, and Bradshaw 2016; Koenig, King, and Carson 2012; Schieman, Bierman, and Ellison 2013). Although the modest existing literature points to salutary associations between religion and sleep, several important limitations need to be addressed: (1) heavy reliance on rudimentary religion measures, typically emphasizing organizational and nonorganizational practices such as attendance and prayer; (2) neglect of the potential stress-buffering effects of religious factors vis-à-vis sleep outcomes (for a rare exception, see White et al. 2018); and (3) inattention to the processes that mediate or explain any stress-buffering effects of religion on sleep (mediated moderation). Our study contributes to the literature by addressing each of these limitations.

In the pages that follow, we briefly review the connections between one particularly important type of psychosocial stress—namely, stressful life events—and sleep. We then develop a series of theoretical arguments explaining why religious involvement should buffer the noxious effects of life events on sleep quality. Although we consider the roles of organizational and nonorganizational religious practices, we also highlight two distinct religious cognitions: (1) a perceived secure attachment to God; and (2) a subjective certainty in personal salvation, or the conviction that one is destined for a blissful afterlife. Next, we develop a theoretical argument outlining a process of mediated moderation in which religious involvement buffers the association between stressful life events and sleep by reducing symptoms of depression. Relevant hypotheses are then tested with national, cross-sectional survey data from the 2017 Baylor Religion Survey ($n =$ 1,410). After presenting results from multivariate regression analyses, we discuss a number of implications, limitations, and promising directions for future research.

THEORETICAL AND EMPIRICAL BACKGROUND

Stressful Life Events and Sleep

Psychosocial stress has been established as a robust determinant of sleep impairment (Kim and Dimsdale 2007). Although research in this area has focused on various sources of stress (e.g., Hale, Hill, and Burdette 2010; Mai et al. 2018), the study of major life events has a long history in the literature on sleep outcomes (Guastella and Moulds 2007; Healey et al. 1981; Williamson et al. 1995). Stressful events may increase the risk of insomnia and other forms of sleep disruption partly because distressed individuals experience high levels of cognitive arousal and rumination (Guastella and Moulds 2007; Morin, Rodrigue, and Ivers 2003). For example, they may obsessively review the details and circumstances surrounding a given event, the problem-solving or emotion-regulation efforts required for adaptive response, as well as any accompanying

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[1]We should note that although our study centers on population-based research, a number of clinical studies have also made important contributions to the study of religion and sleep (e.g., Khoramirad et al. 2015; Kopp et al. 2017; Vidal and Shocat 2017).

challenges to their sense of self or major life goals. All of this may make it difficult to relax, fall asleep, and sustain normal sleep architecture (Guastella and Moulds 2007; Morin, Rodrigue, and Ivers 2003). Following a stressful event, people may also develop anxiety about the very prospect of sleep loss and its cumulative consequences for health and role performance, further amplifying the noxious effects of stressful life events on sleep (Harvey 2002). The above considerations lead to our first hypothesis:

H1:   *The number of recent life events will be inversely associated with sleep quality.*

The Stress-Buffering Role of Religious Practices

Religion is a complex, multidimensional phenomenon (e.g., Idler et al. 2003) and various facets of religious involvement may be differentially associated with sleep (Hill, DeAngelis, and Ellison 2018). At a minimum, researchers typically distinguish between organizational (e.g., service attendance) and nonorganizational (e.g., prayer, scripture reading) forms of religious involvement. In addition, scholars have become increasingly interested in the health implications of religious cognitions, particularly beliefs about God and the afterlife (Flannelly 2017; Park 2017; Schieman, Bierman, and Ellison 2013). In this study, we explore the possibility that each of these religious dimensions may moderate the association between stressful events and sleep. Although a small body of literature has linked religious factors with sleep outcomes in diverse samples (for a recent review, see Hill, DeAngelis, and Ellison 2018), the possible stress-buffering effects of religion on sleep appear to have been addressed only once, and only among a sample of active-duty U.S. military personnel (White et al. 2018). In what follows, we explain why certain religious practices and cognitions should buffer the effects of major life events on sleep outcomes in the general U.S. population.

Organizational Religious Involvement

Why might organizational religious involvement—specifically attendance at worship services—mitigate the effects of stressful life events on sleep quality? Although this issue has rarely been explored in empirical research on sleep, the broader literature on religion and well-being suggests several plausible mechanisms. First, religious congregations bring together individuals who share common beliefs, values, and interests on a regular basis to engage in collective worship activities and rituals to which they ascribe sacred significance (Ellison and George 1994; Idler et al. 2009). These joint activities tend to build solidarity among co-religionists and contribute to a shared sense of meaning and purpose. Interactions with co-religionists may therefore promote positive cognitions and emotions, thus diverting attention from personal problems and challenges (e.g., Krause 2009). Sermons and other formal religious communications may also reinforce the plausibility of religious belief systems, in turn promoting subjective certainty in the validity of one's religious worldview (Ellison 1991; Sethi and Seligman 1993). This may ultimately provide insights regarding (1) how to effectively manage negative emotions like grief or anger in the wake of stressful events and (2) how to remedy stressful circumstances.

Second, church members often provide much needed assistance to their fellows, including tangible (i.e., goods, services, or money) and socioemotional (i.e., love and compassion) support (Krause 2008). Religious organizations also provide spiritual support through one-on-one interactions and small group experiences. In the wake of stressful events, co-religionists may assist each other with realizing the precepts of their faith and applying spiritual insights to the interpretation of stressful events (Krause 2008). Church-based support can be especially comforting for recipients to the extent they share common definitions of specific stressors and invoke shared religious discourses with co-religionists (Ellison and George 1994; Krause 2006a). Moreover, church-based support may promote the use of positive religious coping practices (Krause et al.

2001), which have been linked with better psychosocial adjustment to stressful events and conditions (Ano and Vasconcelles 2005; Pargament 1997). For all of these reasons, it is plausible that regular churchgoers may experience less agitation in the wake of negative life events, and, ultimately, better quality sleep. This leads to our second hypothesis:

H2: *Religious attendance will attenuate the association between recent life events and sleep quality.*

Nonorganizational Religious Practices

There are also several reasons to expect nonorganizational religious practices to buffer the impact of stressful events on sleep quality. For one, private prayer may be especially important in assisting people who are dealing with major life events. Briefly, individuals build relationships with a (perceived) divine other in much the same way they construct concrete social bonds, namely, through interpersonal interaction and conversation (Pollner 1989). Although prayer is sometimes petitionary or contemplative (Poloma and Gallup 1991), it is more often colloquial, as believers tend to engage in an ongoing conversation with a divine other (e.g., God, Jesus) who they view as an intimate friend (Cerulo and Barra 2008; Sharp 2010). Believers can gain comfort and solace through regular conversations with God, as well as an underlying sense of security from having a beneficent, all-powerful confidant who is available at any time for consultation (Pollner 1989; Sharp 2010).

Interactions with God may also be augmented by scriptural study, which can facilitate a process of religious role-taking and deepen conversational prayer (Pollner 1989). By reading the Bible or other religious texts, believers gain a richer understanding of how God has interacted with people throughout history, what God wants and expects from them, and what God promises to the faithful (Wikström 1987). All of this may be particularly important for dealing with stressful life events. For example, many persons can cite specific scriptural passages from which they derive great comfort in times of distress. Akin to regular prayer, distressed persons may find hope and relief through frequent Bible reading, easing cognitive arousal in the face of major life events and ultimately facilitating sound sleep. Although few studies have focused specifically on the mental or physical health implications of Bible study (or other scripture reading), one recent study showed that frequent Bible study moderated the association between stressful life events and psychological well-being among U.S. adults (Krause and Pargament 2018). This leads to our third hypothesis:

H3: *Private or nonorganizational religious practices (i.e., prayer and scripture reading) will attenuate the association between stressful life events and sleep quality.*

The Stress-Buffering Role of Religious Cognitions

Until recently, the possible mental and physical health implications of religious cognitions and beliefs have received short shrift from empirical researchers (Park 2017; Schieman, Bierman, and Ellison 2013). Over the past two decades, however, religion-health scholars have shown new interest in religious beliefs (Flannelly 2017; Schieman, Bierman, and Ellison 2013). How and why might religious beliefs moderate the association between stressful life events and sleep outcomes? One important line of recent work offers a valuable insight: religiosity in general, and religious cognitions in particular, are associated with positive reappraisal coping or the tendency to reinterpret potentially troubling events and conditions in less threatening terms (DeAngelis and Ellison 2017; Park 2017; Vishkin et al. 2016).

Beliefs About God

One important direction in this area has centered on beliefs about God. For example, investigators have examined the apparent psychosocial advantages associated with distinct types of God imagery (Bradshaw, Ellison, and Flannelly 2008; Flannelly 2017; Schieman et al. 2017; Stroope, Draper, and Whitehead 2013), as well as perceptions of divine control (DeAngelis 2018; DeAngelis and Ellison 2017; Krause 2005; Schieman, Pudrovska, and Milkie 2005; Schieman et al. 2006; Schieman, Bierman, and Ellison 2010). More recently, scholarly attention has shifted increasingly toward believers' attachments to God, namely, the nature and quality of their relationships with the divine (Granqvist, Mikulciner, and Shaver 2010; Kirkpatrick 2005). This work draws inspiration from a broader literature on attachment theory, which posits that early life relationships with caregivers can shape subsequent relations with romantic partners, friends, and even God, and that different attachment styles can have implications for psychosocial well-being (Kirkpatrick 2005).

Studies have shown that believers who perceive God as a reliable source of assistance and comfort tend to enjoy a wide array of salutary mental and physical health outcomes, while those who perceive God as detached and unreliable tend to experience adverse outcomes (Bradshaw and Kent 2018; Bradshaw, Ellison, and Marcum 2010; Ellison et al. 2014). According to the limited body of work thus far, attachment to God also moderates the associations between stressful events and psychological well-being (Ellison et al. 2012). It is likely that individuals with a secure attachment to God feel confident that He will listen and respond to their needs and concerns at any time (Sharp 2010). Having such a reliable and powerful ally can help believers maintain positive outlooks in the face of major life events (DeAngelis and Ellison 2017), which may ultimately surface as improved sleep quality. This suggests the following study hypothesis:

> H4: *Secure attachment to God will attenuate the association between stressful life events and sleep quality.*

Beliefs About the Afterlife

Another important strand of research on religious cognitions involves belief in (or about) the afterlife, which has only recently reached the agenda of health scholars (Schieman, Bierman, and Ellison 2013). Those persons who hold favorable views of the afterlife—and their place in it—tend to enjoy better psychosocial functioning and lower levels of psychopathology (Flannelly et al. 2008). In particular, individuals who feel assured of spiritual salvation and eternal life (e.g., Heaven) may have a different perspective on potentially stressful events and conditions in this world (Ellison et al. 2001). If, as many of the faithful believe, material existence is really a prelude to a blissful union with God, and perhaps reunion with loved ones, then the anxieties and sorrows of this world should be less pronounced. At most, stressful events are temporary hurdles or speed bumps along the road to eternal salvation. Put another way, one who believes that he or she is spiritually saved and bound for Heaven might not "sweat the small stuff"—and viewed from an eternal perspective, most earthly problems may be perceived as small. It is reasonable to expect that this mindset may result in feelings of peace and reassurance despite negative life events, which could reduce cognitive arousal and rumination and promote higher quality sleep. Although this proposition has never been assessed empirically, studies have linked afterlife beliefs with an array of salutary psychosocial outcomes (Flannelly et al. 2006; Schieman, Bierman, and Ellison 2013). Furthermore, persons who believe in an afterlife have been shown to experience fewer undesirable consequences from negative life events and other stressors (Bradshaw and Ellison 2010; Ellison et al., 2001, 2009). Taken together, the foregoing discussion leads us to the following study hypothesis:

> H5: *Assurance of spiritual salvation will attenuate the association between stressful life events and sleep quality.*

Depressive Symptoms as Mediators

In their recent review of the religion-sleep connection, Hill, DeAngelis, and Ellison (2018) lament the fact that few studies have ever explored the pathways (mediators) via which religious factors may shape sleep outcomes. Indeed, with only a few exceptions (Ellison et al. 2011; Krause et al. 2017), studies in this nascent area of research have focused primarily on direct associations between religion and sleep. Hill, DeAngelis, and Ellison (2018:329) also argue that "once we begin to consider subgroup variations in the effects of religious involvement, empirical explanations for these patterns should also be formally tested (i.e., mediated moderation)."

Here, we focus on depressive symptoms as a potential explanatory mechanism. To be sure, the association between sleep and psychiatric disorders is complex and almost certainly bidirectional (Krystal 2012; Riemann, Berger, and Voderholzer 2001). Nevertheless, depression is an especially plausible mediator of the religion–sleep relationships for two reasons (Cutler 2018; Nutt, Wilson, and Paterson 2008). First, depression has shown to degrade sleep quality. Indeed, insomnia and related sleep problems are widely considered to be symptoms of depression (e.g., Lin and Stevens 2014; Radloff 1977). According to recent research, depression can adversely affect sleep architecture by reducing sleep efficiency, increasing the time required to fall asleep, and leading to more frequent and lengthier periods of wakefulness throughout the night (Nutt, Wilson, and Paterson 2008). Moreover, depression causes less slow-wave sleep and also alters REM sleep through (1) shorter REM latency, (2) increased duration of the first REM period, and (3) increased number of eye movements (REM density) (Cutler 2018; Nutt, Wilson, and Paterson 2008). In sum, depression can undermine both the quantity and quality of sleep, which is why impaired sleep is typically recognized as a common symptom of depression.

Second, a large and growing body of research reveals that multiple dimensions of religiosity—including those discussed above—are positively associated with psychological well-being and inversely related to major depression (Maselko, Gilman, and Buka 2009) and depressive symptoms (Schieman, Bierman, and Ellison 2013), especially for persons dealing with stress (Smith, McCullough, and Poll 2003). For example, studies have found that religious attendance moderates the association between stressors (e.g., financial problems, poor health) and symptoms of depression and distress (Bradshaw and Ellison 2010; Strawbridge et al. 1998; Williams et al. 1991). Private religious practices such as prayer and scripture reading can also assist with emotion management and can moderate the links between stressors and depressive symptoms and other psychological problems (Krause and Pargament 2018; Sharp 2010). A modest but growing literature has shown that religious cognitions—secure attachment to God, and belief in a favorable afterlife—also moderate the association between stressors and depressive symptoms (Bradshaw, Ellison, and Marcum 2010; Ellison et al., 2009, 2012). Taken together, these arguments suggest a final hypothesis:

H6: *Any attenuation of the association between stressful life events and sleep quality will at least be partially mediated or explained by lower levels of depressive symptoms (mediated moderation).*

Methods

Data

We tested our hypotheses with cross-sectional data from the 2017 Baylor Religion Survey. This study was fielded using a self-administered pen and paper questionnaire with mail-based collection only. The sample was selected using ABS (address-based sample) methodology based on a simple stratified sample design. In particular, the target population (U.S. adults) was stratified

by race-ethnicity and age group to ensure minimum coverage of minority subpopulations. Gallup distributed questionnaires with an invitation letter, return envelope, and $1 USD cash incentive. A total of 1,501 surveys were completed. The final sample is comparable to the 2016 General Social Survey on a number of key demographics, including religious and political characteristics, age, gender, education levels, and marital status (see http://www.baylor.edu/baylorreligionsurvey).

Measures

Past-month sleep quality. Respondents answered the following three questions regarding their sleep patterns during the past month: (1) their average duration of sleep each night; (2) how often they had trouble falling asleep (reverse-coded); and (3) how often they felt rested in the morning. Sleep duration was coded in number of hours, while trouble falling asleep and feeling rested in the morning were coded as ordinal measures (1 = never, 4 = most of the time). We standardized the three items before creating a mean index of past-month sleep quality, with higher scores reflecting improved quality of sleep (alpha = .55). Principal component analysis confirmed all three standardized items load onto a single component with an eigenvalue of 1.59 and eigenvectors ranging from .54 to .60.

Recent life events. Respondents were asked if any of the following 10 major events happened to them in the past year: (1) had a child, (2) got married, (3) got divorced/separated, (4) experienced a death of a loved one, (5) got a new job/promotion, (6) lost a job, (7) got a long-term illness or injury, (8) moved, (9) had house foreclosed, and (10) failed at something important to them. Response choices were coded 0 (no) and 1 (yes). Responses were summed to create a checklist inventory of recent life events. Because very few respondents (4 percent) reported more than three recent life events, these outlying scores were collapsed into a single category of three or more events.

Religious involvement. Organizational religious involvement was gauged with a single-item measure of religious attendance that asked respondents: "How often do you attend religious services at a place of worship?" Response categories ranged from 0 (never) to 7 (several times a week). We measured nonorganizational or private religiousness with a two-item additive index of frequency of prayer and scripture reading (alpha = .76). Respondents answered how often they spent time alone (outside of religious services) either praying or reading "the Bible, Koran, Torah, or other sacred book." Responses for frequency of prayer ranged from 0 (never) to 5 (several times a day). Frequency of reading scripture had response categories ranging from 0 (never) to 8 (several times a week or more).

Religious cognitions. We assessed religious cognitions with two separate measures for secure attachment to God and assurance of salvation. To measure secure attachment to God, respondents were first asked: "Which one statement comes closest to your personal beliefs about God?" Those who answered "I do not believe in God" were not asked any follow-up questions about their relations with God ($n = 126$). To account for these respondents in our analyses, all models include a dummy variable coded 1 = "does not believe in God" and 0 = "believes in God." Secure attachment to God consisted of the following four items (1 = strongly disagree, 4 = strongly agree): (1) God seems impersonal to me (reverse-coded); (2) God seems to have little or no interest in my personal problems (reverse-coded); (3) God knows when I need support; and (4) I feel that God is generally responsive to me. Responses were averaged, with higher scores reflecting a more secure attachment to God (alpha = .88). Finally, assurance of salvation was measured with a single item that asked respondents: "How certain are you that you will get into Heaven?" Original response categories were ordinal and ranged from 1 (very certain) to 5 (not at all certain), with additional responses for "I don't know" and "I don't believe in Heaven." To gauge assurance in personal salvation, we dummy-coded this measure such that 1 = very certain and 0 = not very certain.

Depressive symptoms. Depressive symptoms were measured with a 10-item version of the Center for Epidemiological Studies Depression (CESD) index (Radloff 1977). Respondents were asked how often in the past week they (1) were bothered by things that usually didn't bother them; (2) could not shake off the blues; (3) felt just as good as other people (reverse-coded); (4) had trouble keeping their mind on what they were doing; (5) felt depressed; (6) felt too tired to do things; (7) felt happy (reverse-coded); (8) enjoyed life (reverse-coded); (9) felt sad; and (10) felt that people disliked them. Response choices ranged from 1 (never) to 4 (most or all of the time). Responses to the 10 items were averaged to create a mean index, with higher scores indicating greater depressive symptoms (alpha = .85).

Control variables. Models also controlled for *religious affiliation* (conservative Protestant, mainline Protestant, black Protestant, Catholic, other, none), *gender* (male = 0, female = 1), *age* (in years), *race/ethnicity* (white, black, other), *marital status* (single = 0, married = 1), *education* (ordinal, 8th grade or less = 1, postgraduate = 9), *employment status* (unemployed = 0, employed = 1), *household income* (ordinal, $10,000 or less = 1, greater than $150,000 = 7), and *residential status* (large city, suburb, small city or town, rural area). Weighted descriptive statistics of study variables are reported in Table 1.

Analytic Strategies

To assess hypotheses 1 through 5, Table 2 reports a series of five ordinary least squares (OLS) regression models that regress past-month sleep quality on recent life events, measures of religious involvement, and their interactions. Model 1 reports estimated net effects of life events and focal religion variables on sleep quality. Models 2 through 5 introduce separate interaction terms between life events and religious attendance, private religious practices, secure attachment to God, and assurance of salvation, respectively. Continuous variables are mean-centered before estimating interaction terms. All analyses adjust for control variables and poststratification weighting to better reflect the population of U.S. adults. Coefficients for control variables are excluded to conserve space (full models available upon request).

There are two general approaches to mediation models and we use both of these to test our mediated moderation hypothesis. The first is the "coefficient change" approach, which assesses the change in the coefficient for the focal predictor before and after the mediator variable is added to the regression equation. This approach is tested with the Clogg statistic (Clogg, Petkova, and Haritou 1995). In this case, we assess the change in the coefficients for our focal interaction terms before and after controlling for depressive symptoms. The second is the "indirect effect" approach, which assesses the statistical significance of the product of two coefficients: the coefficient for the effect of the focal predictor on the mediator and the coefficient for the effect of the mediator on the outcome. This approach is tested with the Sobel statistic (Sobel 1982). This latter approach requires information for each link in the proposed causal process, namely, the product of the coefficient for the interaction term in the prediction of depressive symptoms and the coefficient for the effect of depressive symptoms on sleep. The Sobel test is a useful comparison because it is considered to be a conservative mediation test (Hayes 2013).

To facilitate the presentation of complex mediated moderation analyses, we depict main findings as linear prediction graphs (Figures 1 and 2). Both figures are constituted by two separate graphs depicting sleep quality scores (*y*-axis) as a function of recent life events (*x*-axis) and the focal religious measure. The graph on the left (Model A) shows the interaction term before controlling for depressive symptoms, while the graph on the right (Model B) shows the same interaction after controlling for depressive symptoms. Accompanying these figures is a table of estimated marginal effects on linear predictions of sleep quality (Table 4). This table reports linear associations between recent life events and sleep quality (1) while holding the focal religious measure at certain specified values, and (2) before and after controlling for depressive

Table 1: Weighted descriptive statistics: 2017 Baylor Religion Survey ($n = 1,410$)

	Range	Mean/Proportion	SD
Focal Variables			
Sleep quality	−2.83–2.17	−.46	.75
Recent life events	0–3	1.13	1.04
Religious attendance	0–7	3.03	2.56
Private religiousness	0–12	5.25	4.26
Secure attachment to God	1–4	3.10	.80
Assurance of salvation	0–1	.28	
Depressive symptoms	1–4	1.89	.52
Control Variables			
Age	18–98	49.16	17.65
Male (reference)	0–1	.47	
Female	0–1	.53	
White (reference)	0–1	.76	
Black	0–1	.11	
Other race	0–1	.13	
Single (reference)	0–1	.49	
Married	0–1	.51	
Education	1–9	5.18	2.28
Unemployed (reference)	0–1	.33	
Employed	0–1	.67	
Household income	1–7	4.25	1.74
Large city (reference)	0–1	.25	
Suburb	0–1	.29	
Small city/town	0–1	.33	
Rural	0–1	.13	
Conservative Protestant (reference)	0–1	.28	
Mainline Protestant	0–1	.12	
Black Protestant	0–1	.07	
Catholic	0–1	.25	
Other religion	0–1	.09	
No religious affiliation	0–1	.19	
Believes in God (reference)	0–1	.90	
Does not believe in God	0–1	.10	

symptoms. Table 4 is basically a numerical representation of Figures 1 and 2, but with additional tests of statistical significance accompanying each interaction term slope.

Finally, the following variables had missing data: sleep quality ($n = 78$), recent life events ($n = 106$), depressive symptoms ($n = 98$), religious attendance ($n = 56$), prayer ($n = 65$), scripture reading ($n = 24$), religious affiliation ($n = 46$), secure attachment to God ($n = 47$), assurance of salvation ($n = 30$), gender ($n = 34$), age ($n = 99$), race ($n = 75$), marital status ($n = 29$), education ($n = 32$), employment status ($n = 85$), household income ($n = 84$), and residential status ($n = 44$). With the exception of our dependent variable (sleep quality), all analyses replaced these missing values with 25 iterations of multiple imputation by chained equation (Johnson and Young 2011). Main findings were comparable before and after imputation.

Table 2: Ordinary least squares (OLS) regression models predicting past-month sleep quality ($n = 1,410$)

	Model 1	Model 2	Model 3	Model 4	Model 5
Focal Variables					
Recent life events	−.082**	−.074**	−.078**	−.076**	−.113***
	(.027)	(.027)	(.028)	(.027)	(.032)
Religious attendance	.009	.009	.010	.011	.010
	(.016)	(.016)	(.016)	(.016)	(.016)
Private religiousness	−.005	−.006	−.006	−.006	−.005
	(.011)	(.011)	(.011)	(.011)	(.011)
Secure attachment to God	.062	.058	.060	.052	.062
	(.054)	(.054)	(.055)	(.053)	(.054)
Assurance of salvation	.104	.111	.111	.111	.098
	(.063)	(.063)	(.062)	(.062)	(.062)
Interactions [Recent life events × …]					
Religious attendance	–	.017	–	–	–
	–	(.010)	–	–	–
Private religiousness	–	–	.009	–	–
	–	–	(.006)	–	–
Secure attachment to God	–	–	–	.049*	–
	–	–	–	(.022)	–
Assurance of salvation	–	–	–	–	.122*
	–	–	–	–	(.053)
Constant	−.598*	−.637**	−.709**	−.509*	−.680**
Adjusted R^2	.074	.076	.075	.080	.078

Notes: Unstandardized coefficients reported with robust standard errors in parentheses. All models adjust for probability weighting and control variables.
*$p < .05$; **$p < .01$; ***$p < .001$ (two-tailed).

Figure 1
Life events by attachment to God on sleep quality: Before (Model A) and after (Model B) controlling for depressive symptoms
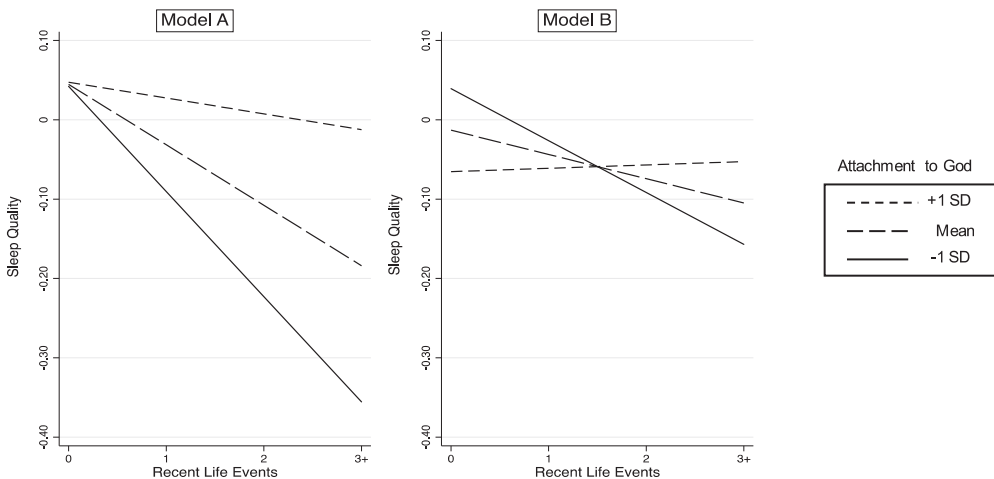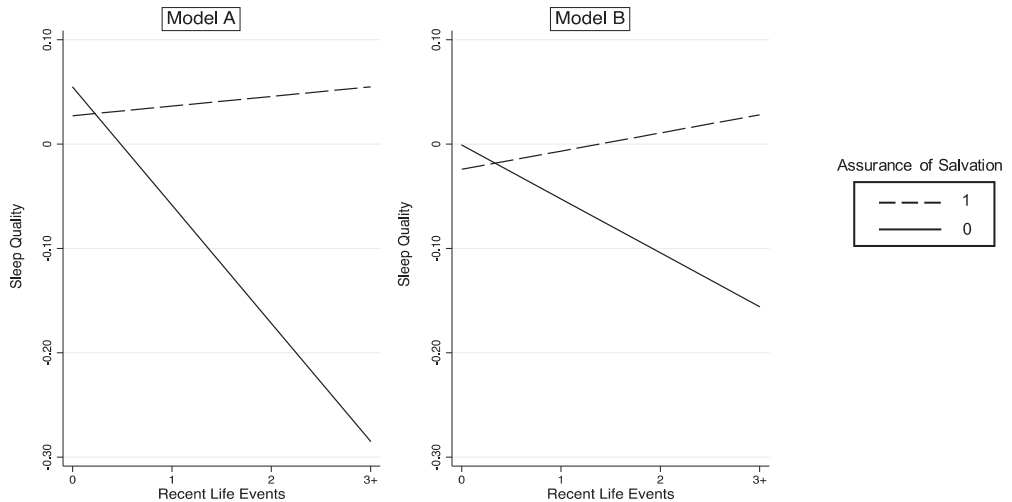
Figure 2

Life events by assurance of salvation on sleep quality: Before (Model A) and after (Model B)
controlling for depressive symptoms

RESULTS

Table 2 reports results from OLS regression models predicting past-month sleep quality. In Model 1, the number of recent life events was inversely associated with sleep quality and this association was statistically significant net of control variables ($b = -.082$, $p < .01$). Moreover, the interaction terms in Models 2 and 3 were statistically insignificant, indicating the association between recent life events and sleep quality did not vary according to levels of religious attendance or private religiousness. Nonetheless, both interaction terms in Models 4 and 5 were positive and statistically significant ($p < .05$), indicating that secure attachment to God and assurance of salvation attenuated the negative association between recent life events and sleep quality.

Table 3 reports results from OLS regression models testing for mediated moderation. Models 1a and 2a are identical to Models 4 and 5 in Table 2, serving only as contrasts to Models 1b and 2b, which additionally control for depressive symptoms. We found that the interaction terms between recent life events and religious cognitions were no longer statistically significant after controlling for depressive symptoms. Moreover, the Clogg statistics were statistically significant at conventional levels for the interactions with secure attachment to God ($t = 2.28$, df $= 1,407$, $p < .05$) and assurance of salvation ($t = 2.28$, df $= 1,407$, $p < .05$), indicating a significant reduction in the magnitude of the interaction terms after accounting for symptoms of depression. The Sobel statistic was marginally significant for secure attachment to God ($z = 1.73$, se $= .01$, $p < .10$) and statistically significant at conventional levels for assurance of salvation ($z = 2.11$, se $= .02$, $p < .05$), indicating a significant indirect effect of the interaction term on sleep quality through depressive symptoms. These results support our mediated moderation hypothesis. In other words, both interactions were fully mediated or explained by depressive symptoms.

Figures 1 and 2 provide a clearer picture of these results. In both figures, the graphs on the left (Model A) show that respondents who scored high on secure attachment to God, or who were very certain they were going to Heaven when they die, tended to report little or no difference in sleep quality as their number of recent life events increased. On the other hand, respondents who were less secure in their relationship with God, or who expressed doubts about their prospects of a blissful afterlife, reported significantly steeper declines in sleep quality as a function of recent

Table 3: Ordinary least squares (OLS) regression models testing for mediated moderation ($n = 1,410$)

	Model 1a	Model 1b	a≠b	Model 2a	Model 2b	a≠b
Focal Variables						
Recent life events	−.076**	−.031		−.113***	−.052	
	(.027)	(.025)		(.032)	(.029)	
Secure attachment to God	.052	−.014		.062	−.008	
	(.053)	(.045)		(.054)	(.045)	
Assurance of salvation	.111	.055		.098	.048	
	(.062)	(.055)		(.062)	(.055)	
Depressive symptoms	–	−.606***		–	−.607***	
	–	(.050)		–	(.050)	
Interactions [Recent life events ✕ …]						
Secure attachment to God	.049*	.030	†	–	–	
	(.022)	(.020)		–	–	
Assurance of salvation	–	–		.122*	.069	†
	–	–		(.053)	(.045)	
Constant	−.509*	.715***		−.680**	.746**	
Adjusted R^2	.080	.236		.078	.235	
RMSE	.717	.654		.718	.654	

Notes: Unstandardized coefficients reported with robust standard errors in parentheses. All models adjust for probability weighting, religious attendance, private religiousness, and control variables.
*$p < .05$; **$p < .01$; ***$p < .001$ (two-tailed).
"a≠b" indicates Clogg tests for mediation.
†Indicates a statistically significant ($p < .05$) difference between interaction term coefficients after adjusting for depressive symptoms.

Table 4: Marginal effects on linear predictions of sleep quality ($n = 1,410$)

Variables	Model 1a	Model 1b	Model 2a	Model 2b
Recent life events:				
@ Attachment to God = −1 SD	−.133***	−.065*	–	–
@ Attachment to God = Mean	−.077**	−.031	–	–
@ Attachment to God = +1 SD	−.020	.004	–	–
Recent life events:				
@ Assurance of salvation = 0	–	–	−.113***	−.052
@ Assurance of salvation = 1	–	–	.009	.017

Notes: Based on models from Table 3. Model A = excluding depressive symptoms. Model B = controlling for depressive symptoms.
*$p < .05$; **$p < .01$; ***$p < .001$ (two-tailed).

life events (see Table 4). Finally, the graphs on the right (Model B) show that the differences in slopes become modest after controlling for depressive symptoms.

DISCUSSION AND CONCLUSION

Inadequate sleep has been linked to an array of negative outcomes, including impaired social and occupational functioning and risk of premature death (Davies et al. 2014; Engle-Friedman

et al. 2003; Grandner et al. 2010). Although many studies have explored social influences on sleep, the role of religion has received only limited attention to date. Our study augmented this literature by examining (1) whether multiple dimensions of religious involvement buffered the link between stressful life events and poor sleep quality, and (2) whether depressive symptoms mediated any observed stress-buffering patterns. Relevant hypotheses were evaluated using data collected from a recent national sample of U.S. adults. Several particular findings deserve discussion.

First, consistent with a number of previous studies, we found that the number of stressful life events experienced during the year prior to the interview was inversely associated with sleep quality (Healey et al. 1981; White et al. 2018; Williamson et al. 1995). For many individuals, stressful events provoke a repetitive analysis of the causes and implications of events, resulting in high levels of cognitive arousal and rumination (Guastella and Moulds 2007). In the aftermath of stressful life events, individuals may also anticipate difficulty falling or staying asleep, and may develop anxiety about sleep problems and their effects on daytime functioning (Harvey 2002). This anxiety may further deepen the effects of stressful events on sleep.

Did religion moderate the deleterious effects of stressful life events on sleep? According to our results, the answer depends on the dimension of religious involvement being considered. Although previous studies have documented salutary associations between sleep outcomes and organizational and nonorganizational religious practices, we found no evidence that either of these dimensions of religious involvement mitigated the harmful consequences of stressful events on sleep. Our findings were therefore largely consistent with White et al.'s (2018) aforementioned study of U.S. military personnel, which also failed to uncover any stress-buffering effects of religious attendance on sleep quality. On the other hand, White et al. did find that the extent to which soldiers relied on their religious/spiritual beliefs in their daily decision making significantly buffered the effects of traumatic combat experiences on sleep disturbance. Thus, an emergent theme appears to be that religious/spiritual cognitions are most effective for buffering the impact of stressors on sleep.

There is a possibility that this verdict could change with access to more fine-grained measures of religious practices, particularly measures that account for the specific contents and motivations behind each practice (see DeAngelis, Bartkowski, and Xu 2018). For example, the role of organizational religiosity might become clearer with specific measures of church-based support. In particular, it would be useful to distinguish between interactions that (1) make church members feel loved and cared for (i.e., socioemotional support), and (2) assist people in applying religious/spiritual insights to their daily lives and problems (i.e., spiritual support;) (Krause 2008, 2009). These and other distinct facets of congregational life could help soothe people who are dealing with stressful events, perhaps culminating in more positive sleep outcomes (Idler et al. 2009). The same is true for frequency of prayer and scripture reading. We might learn more with detailed measures of prayer types and expectancies—namely, whether prayer is intended to be colloquial, meditative, petitionary, or ritualistic—as well as with measures of domain-specific scripture readings and practices DeAngelis et al. 2018; Ellison et al. 2014; Poloma and Gallup 1991). All of these are promising avenues for further research. For now, though, the mere frequency of praying and reading scripture appears to be inconsequential for moderating the effects of stressful events on sleep.

In contrast to the negligible role of religious practices, two distinct religious cognitions— secure attachment to God and assurance of salvation—did buffer the association between stressful life events and sleep quality. These findings resonate with an emerging body of research on the role of religious beliefs for health and well-being (Flannelly 2017; Schieman, Bierman, and Ellison 2013). As Park (2017) has pointed out, religious cognitions can shape interpretations of potential stressors, thereby influencing whether or to what extent challenging circumstances provoke distress. Certain religious beliefs may therefore aid the faithful in evaluating potentially stressful events in terms that are less threatening to their core perceptions of self and reality (DeAngelis 2018; DeAngelis and Ellison 2017; Vishkin et al. 2016).

Why should perceptions of a secure attachment to God or the conviction that one is spiritually saved promote better sleep in the face of stressful events? For one, belief in a loving and supportive deity can act as a "force multiplier" that facilitates productive coping skills (Bradshaw and Kent 2018; Bradshaw, Ellison, and Marcum 2010). That is, perceiving God as all-powerful and unconditionally loving can provide a secure base from which to engage with the world, and ultimately curb existential uncertainties stemming from stressful or traumatic events (Granqvist, Mikulciner, and Shaver 2010; Kirkpatrick 2005). Believers may be unable to comprehend why misfortune has befallen them, but they may nevertheless sleep better at night knowing that the universe is under the watchful eye of a deity who, at the end of the day, remains deeply concerned with the well-being of the world and its inhabitants (DeAngelis and Ellison 2017). For similar reasons, people who are convinced they are destined for a blissful afterlife consisting of union with God, and perhaps reunion with loved ones, should also feel less troubled by worldly problems (Flannelly et al. 2006, 2008). These persons may be less inclined to derive their sense of self and purpose from material achievements or other earthly activities and statuses. Major life events involving loss or other fundamental changes are thus likely to be perceived as less threatening (Bradshaw and Ellison 2010; Ellison et al. 2009), resulting in diminished cognitive arousal and better sleep in the wake of such events.

Another important contribution of this study is our examination of mediators via which religion might buffer the effects of stressful events on sleep quality. A recent review of the religion-sleep connection (Hill et al. 2018) identified mental health as an important potential mediator. Depression has been shown to increase the risk of subsequent insomnia and other forms of sleep disruption (Cutler 2018; Nutt, Wilson, and Paterson 2008), such that sleep problems are often regarded as symptoms of depression (Lin and Stevens 2014). Both stressful events and religion have also been associated with depression independently and interactively. Specifically, multiple dimensions of religious involvement have shown to moderate associations between stressors and depressive symptoms (e.g., Ellison et al. 2009, 2012; Smith, McCullough, and Poll 2003). To our knowledge, however, this is the first empirical study to specify and test a mediated moderation model that provides an explanatory mechanism of the stress-buffering role of religious cognitions.

Although the present study has advanced the nascent religion-sleep literature, several issues remain unaddressed. First, additional religious domains should be explored in the future, including: (1) specific aspects of congregational support practices, including spiritual support (Krause 2008); (2) diverse styles and practices of prayer and scriptural study (DeAngelis et al. 2018; Ellison et al. 2014; Poloma and Gallup 1991); (3) religious coping styles and practices (Ano and Vasconcelles 2005; Pargament 1997); and (4) religiously inspired character strengths or virtues, such as hope, gratitude, and forgiveness (Krause 2006b; Krause and Ellison 2003; Krause et al. 2017).

Second, religion-sleep researchers should explore other complex and contingent associations. Numerous studies have shown that religious factors tend to confer particular health benefits among members of marginalized social groups, such as racial-ethnic minorities and persons of low socioeconomic status (Bradshaw and Ellison 2010; Schieman et al. 2006, 2010). Religion and health scholars have also begun to develop and test moderated moderation hypotheses (i.e., three-way interactions), uncovering contexts in which the stress-buffering effects of religion are amplified among certain disadvantaged segments of the population, such as the elderly and undereducated (DeAngelis and Ellison 2018; Jung 2018). Future studies may benefit from exploring whether similar complex patterns apply to sleep outcomes.

Third, a growing literature has linked "spiritual struggles" with negative health outcomes, although few of these studies have focused on sleep (for an exception, see Ellison et al. 2011). Such struggles are typically of three types: (1) divine or troubled relationships with God; (2) intrapsychic or chronic and unresolved religious doubting; and (3) interpersonal or negative interactions in religious settings (Exline et al. 2011, 2014). In addition to whatever direct associations may exist between spiritual struggles and health, such struggles have shown to

exacerbate the effects of stressors on well-being (McConnell et al. 2006). The possible links between spiritual struggles and sleep are clearly ripe for further exploration.

This study is also characterized by several shortcomings. First, our data are cross-sectional and thus entail the usual caveats. Although we can document associations, we cannot make strong causal claims because we lack data on the temporal ordering among our key variables. Future studies using longitudinal data are needed. A second limitation involves the measurement of our focal variables. Specifically, sleep quality is a self-report measure based on three items comprising an index of subpar reliability. Research on religion and sleep can be advanced further with the use of more extensive and well-validated measures such as the Pittsburgh Sleep Quality Index (Buysse et al. 1989), as well as with biological markers of sleep architecture. Moreover, although our religious items are adequate for gauging key constructs in our study, single-item religion measures can still suffer from low reliability. The development of multi-item measures of scripture reading or afterlife beliefs, for instance, would be a welcome addition to work in this field (e.g., DeAngelis, Bartkowski, and Xu 2018).

Such limitations notwithstanding, the current study has made significant contributions to the religion and sleep literature. First, our study explored the role of multiple dimensions of religion in mitigating the noxious effects of stressful life events on sleep. Although public and private religious practices have been central to the religion-sleep literature to date, we found that only religious cognitions—namely, secure attachment to God and assurance of salvation—attenuated the inverse association between stressful events and sleep quality. Second, our analyses showed that the stress-buffering role of religious cognitions was explained by lower levels of depressive symptoms. Given the importance of sleep for many facets of health and well-being, further research along the lines sketched above will advance our understanding of the complex relationships among religion, stress, and other social determinants of sleep.

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