J Relig Health (2018) 57:2153–2166
https://doi.org/10.1007/s10943-017-0494-x

ORIGINAL PAPER

# The Interrelation of Prayer and Worship Service Attendance in Moderating the Negative Impact of Life Event Stressors on Mental Well-Being

**G. Rainville**[1]

Published online: 13 September 2017


**Abstract** The interrelation of worship service attendance and private prayer in moderating the negative impact of life event stressors on mental well-being is examined using hierarchical multiple regressions on a national sample of 2601 Americans. A theoretical model is proposed in which stressful life events are made less distressing under conditions in which exposure to pro-social content at worship services is internalized through frequent private prayer. Interactive models controlling for a block of potential confounds are run to confirm that the stress-moderating effects of worship service attendance are noted only when attendance is complemented by relatively frequent engagement in private prayer.

**Keywords** Prayer · Stress · Mental health · Moderation models

## Introduction

Life event stressors such as family conflict, health issues, money problems, etc., may introduce or exacerbate mental and physical health problems, particularly in the absence of an effective regimen for coping (Ledesma and Kumano 2009; Mah et al. 2016; Richardson et al. 2016). Given the potential negative impacts of stress, identifying and promoting behaviors to effectively cope with life event stressors is a public health priority (Van Ness 1999).

To date, researchers have explored supportive resources such as social networks that have occasionally, but not consistently, been found to reduce the negative impact of stressful life events on mental health and well-being outcomes (such as distress, happiness, anxiety, and other similar constructs) (Krause 2009; Krause and Hayward 2012). In this

*Disclaimer* The ideas expressed in this paper do not necessarily reflect those of AARP.

✉ G. Rainville
grainville@aarp.org

[1] Research Department, AARP, Washington, DC, USA

stress-moderation literature, life event stressor measures tend to be operationalized as the simple sum of currently present stressful situations such as family conflict, money problems, and so on (Ensel and Lin 1991). Most of the research on supportive resources and life event stressors has been conducted within the framework of the life-stress paradigm tradition (Lakey and Cohen 2000). Initially in this tradition, the commonly examined supportive resources were related to social networks such as the availability of relatives and friends (Berkman and Syme 1979). Over time, a growing body of research into the moderating effects of prayer and other religious/spiritual (R/S) resources has emerged both within and outside of the life-stress paradigm tradition (Krause 2009). To add to this growing body of research, I investigate the interrelation of two R/S coping resources—worship service attendance and private prayer—and the conditions under which they moderate the negative effects of life event stressors on mental well-being.

Although direct effect methods may be used to examine how a coping resource is related to an outcome measure related to stress (such as a distress indicator), an interactive model is required to determine how a coping resource acts both directly on a measure such as mental well-being and indirectly on the same outcome measure through its effect on a stressor measure (Fairchild and MacKinnon 2008). In cases in which two coping resources may interact with a stressor measure (and each other) to affect mental well-being, interactive modeling enables the detection of changes in the relationship between life event stressors and mental well-being that are dependent on the values of both coping resource predictors. The two coping resources entered in interactive stress-moderation models in this research are devotional R/S practices—the frequency of private prayer and the frequency of worship service attendance (i.e., "going to Church," etc. [Gillum 2006]).

The two questions I address using interactive models are "in the general population, is the stress-moderating potential of attending worship services dependent upon a respondents' level of private prayer?" and "does private prayer have a significant stress-moderating impact among those already engaged in regular worship service attendance?" In examining these questions, I account for a block of potentially confounding factors that co-occur with R/S behaviors (i.e., additional spiritual practices, socializing, healthy lifestyle behaviors, etc.) (Pargament 2002).

The results of these interactive models represent empirical support for a theoretical model in which worship and prayer are necessary complements of each other. In other words, the stress-moderating effects of worship are only noted among those who pray relatively frequently. Furthermore, prayer is found to only moderate the impact of stressors for worshippers. The pattern of findings is one in which worship and prayer together, but neither alone, are associated with significant stress moderation. Although rigorous devotional practices are found within the population-based sample to be effective coping resources, R/S practices do not benefit or interest all (Speed and Fowler 2016). As such, the paper concludes with a discussion of secular analogs to traditional devotional practices and the potential stress-moderating capacities of such analogs.

Beyond potentially indicating an optimal spiritual regimen for stress moderation, this research is important in three other ways. First, it expands the use of mental well-being as a measure of mental health. Mental well-being encompasses eudaimonic (i.e., self-actualizing) and hedonic (i.e., pleasure) components, making it a relatively broad well-being measure (Carpentieri et al. 2016). The mental well-being scale used in this research is the Warwick-Edinburgh Mental Well-Being Scale (WEMWBS) which suits the present purposes in that the WEMWBS has previously been linked to devotional practices (Pandya 2015) and was developed specifically for population-level assessments (Tennant et al.

2007). In spite of such features, the scale has not been frequently used in surveys of the American general population.

The second contribution of this research is that it provides clarity about the stress-moderating roles of prayer and worship service attendance within the population. Finally, this research controls for a large block of potential confounds to R/S practices. Accounting for these factors may address the intuition that the salutary effects of religious and spiritual practices are necessarily due to more mundane factors (George et al. 2002; Pargament 2002).

## The Stress-Moderating Effects of Worship and Prayer

There are multiple aspects of religion and spirituality including devotional practices, religious affiliation, beliefs, and so on (Hackney and Sanders 2003). The questions examined herein are limited to aspects of R/S devotional practices. Specifically, I look at the stress-moderating effects of two such practices—worship service attendance and private prayer—while accounting for other potentially confounding behaviors that co-occur with R/S practices.

Worship service attendance has been viewed as the R/S practice with the greatest direct effect on physical and mental health outcomes (George et al. 2002). However, in interactive models, worship service attendance has not consistently moderated the effects of stress on mental health outcomes (Ellison et al. 2001). Additionally, stress-moderating effects for worship service attendance are not generally observed within broader populations. Rather, such effects are chiefly detected within area samples, population subgroups, or partitioned samples (Hettler and Cohen 1998; Whisman and McClelland 2005).

One possible explanation for the inconsistent or conditional performance of worship service attendance in interactive models may be related to how prayer, a practice related to worship, is handled in models. In a review of studies that examine worship's stress-moderating role, prayer may be controlled for, but it is not generally interacted with stress and worship measures. Interacting stress, worship, and prayer measures would predicate the stress-moderating effectiveness of worship on levels of engagement in prayer. Such an approach may be warranted given noted instances of stress moderation for both prayer and worship in previous studies.

An early study of R/S practices and stress, Hettler and Cohen (1998) found a stress-moderating effect for worship (on a dysphoria outcome measure) evidenced by a significant interaction term (number of negative life events*church attendance frequency) among liberal Protestants. However, using a similar outcome measure in a Detroit area study, Ellison et al. (2001) found direct effects for worship service attendance but no significant outcomes in interactive models. In a rare, population-wide study of worship and stress moderation, Jung (2013) found a significant stress-moderating effect (on a happiness measure) using a nationwide sample of South Koreans. However, this effect was limited to the Protestant females within the sample.

The researchers of these studies handled prayer in differing ways. Hettler and Cohen (1998) tested frequency of prayer and frequency of worship in separate interactive models. Ellison et al. (2001), on the other hand, included frequency of prayer as a simultaneous control. Finally, Jung (2013) included denominational controls, a likely proxy for prayer life and beliefs. In accounting for prayer in various ways, none of these studies interacted the stressor measure with both the frequency of worship and the prayer measure.

Much like the above studies that interacted stressor measures with worship service attendance, varying outcomes are noted in studies looking at the interaction of prayer and stressful life events. To cite a few examples, Hettler and Cohen (1998), in a Protestant subsample, noted the same stress-moderating effect for frequency of prayer that they found previously for frequency of worship. Additionally, using a nationwide sample, Krause (2009) failed to find a significant trauma-moderation effect for the interaction of "childhood traumas*frequency of prayer" on a depressed affect outcome measure (see Tait et al. 2014).

Inconsistent or conditional stress-moderating effects for prayer and worship are noted in reviewing the previous findings. It may be the case that relatively robust or unconditional stress-moderating effects would be noted if stress, worship, and prayer were modeled in a manner that predicates the stress-moderating effects of worship on how often one engages in private prayer. A theoretical model is developed in which worship's stress-moderating potential may only be actuated by relatively frequent prayer and implications of this model are empirically tested.

## An Interactive Stress-Moderation Model of Prayer and Worship

The nature of religious/spiritual practices and why such practices may work together to moderate stress are considered for the sake of developing testable hypotheses. A basic R/S practice, private prayer, is a reflective technique akin to meditation (Ijaz et al. 2017). Prayer may or may not focus attention on a higher power (Jung 2015) but, whatever the case, prayer has served as a source of comfort and hope for thousands of years (Krause and Hayward 2012; Newberg 2010). Prayer shuts out worldly distractions and may provide acute relief from stressors by leading to a calm, reflective state conducive to integrating ideas (Masters and Spielmans 2007). In this state, prayer may lead to better-informed appraisals of stressful life events and balanced reflections upon our relationships (Jung 2015; Ladd and Spilka 2006).

Many Americans who pray also attend worship services in which readings from, and commentaries upon, sacred texts, generally reinforce the harmonious worldviews of attendees' particular faith traditions (Stark and Finke 2000). Jung (2015) notes worship services promote mental well-being owing to the pro-social nature of the content presented at services. This is echoed by Koenig (2009) who categorizes the content of services as instructive for establishing communities and mutual support systems. This content largely advises against aggression, revenge, and other acts running afoul of a premise similar to the golden rule found within most religions and wisdom traditions (Smith 1991). As such, the content counsels against inviting or perpetuating stressful situations, provides solutions to problems of seemingly needless suffering, and otherwise provides means to reduce, or not exacerbate, the impacts of life event stressors.

Bringing the separate but closely related functions of worship and prayer together, more frequent exposure to the pro-social content embedded in worship services creates a reservoir of ideas to consider and integrate during private prayer (Ladd and Spilka 2006; Stark and Finke 2000). Through this regimen that internalizes pro-social content, stressful life events may be reframed in less-distressing or non-escalating ways (Emery and Pargament 2004; Lakey and Cohen 2000). An extension of this model related to frequency of prayer and worship measures is one in which relatively frequent prayer would be expected to lead to successful internalization of the pro-social R/S content to which

frequent worship service attendees are exposed on a relatively ongoing basis. As such, the stress-moderating effectiveness of relatively frequent worship service attendance is dependent upon how frequently one engages in private prayer.

The model, as described above, predicates stress-moderating effects upon interrelated levels of engagement in worship and private prayer. This type of relationship may be tested by entering a three-way interaction term of stressors*frequency of worship*frequency of prayer in a regression using mental well-being as a dependent measure. In such a model, the prayer and worship components represent how frequently these two R/S behaviors occur. The proposed link between these two behaviors, stressors, and mental well-being could be determined errantly if other, potentially confounding behaviors were not accounted for. Behaviors or practices that are sometimes proposed as mechanisms behind the positive effects of R/S practices include co-occurring religious/spiritual practices (i.e., engaging in mindful activities such as meditation, practicing yoga, etc.), healthy lifestyle practices (such as limited alcohol consumption, frequent exercise, etc.), and interests and engagement (such as reading for pleasure, socializing with friends and family, etc.) (Pargament 2002). Researchers have generally noted differentials between non-religious and religious people's engagement styles related to these types of behaviors (Pew Research Center 2016; Van Ness 1999). Because these factors could bear directly on mental well-being and/or mask the effects of the main R/S measures, controlling for them helps point to worship and prayer as the actual drivers of noted stress-moderating effects on mental well-being.

## Modeling Strategy and Hypotheses

Representations of two theoretical models examining how the stress-moderating effects of prayer and worship may be predicated upon each other are presented in Figs. 1 and 2. Figure 1 includes a three-way interaction between stress, prayer, and worship tested on the full sample. Figure 2 includes a two-way interaction between stress and prayer in models partitioned between worshipper and non-worshipper subgroups. The major distinction between the two models is that coefficients in Fig. 2 represent the unique effect of each measure (for example, the "socializing with friends and family" measure) within each subgroup. Partitioning has a few statistical disadvantages, but it is useful if outcome measures may be affected by differing subgroup dynamics in relation to control measures. For example, if the mental well-being effects of socializing or exercise differ between

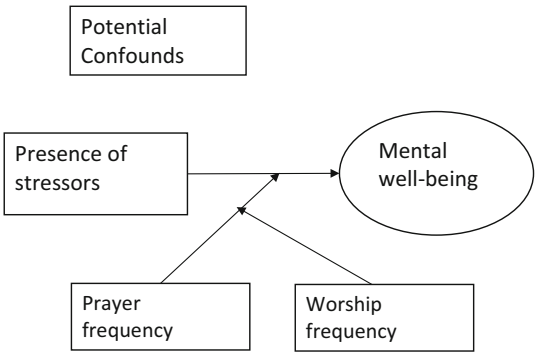


**Fig. 1** Three-way stress-moderation model of prayer, worship service attendance, and life event stressors, for population

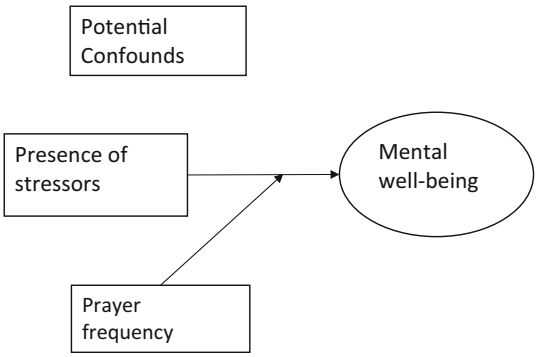


**Fig. 2** Two-way stress-moderation model of prayer, worship service attendance, and life event stressors partitioned for worshippers and non-worshippers

worshippers and non-worshippers, this could be accounted for in separate worshipper and non-worshipper models but possibly not in full population models (Whisman and McClelland 2005).

Two hypotheses are developed related to the models in Figs. 1 and 2.

**Hypothesis 1** May, in a non-null formulation, be stated as "is there a significant interaction between stressors, frequency of prayer and frequency of worship"? That such a positive interaction would be observed in a fully specified model would represent empirical evidence consistent with the proposed theoretical relationship in which private prayer is viewed as necessary for activating the stress-moderating capacities of worship.

**Hypothesis 2** Related to subgroup analysis, may be stated as "does prayer have a significant stress-moderating impact among those already engaged in regular worship service attendance"? Models are partitioned into worshipper and non-worshipper subgroups, and similar to the full population model, significant two-way interactions between stress and prayer, if observed at least among worshippers, would represent evidence consistent with the model.

Testable implications of the theoretical model are explored using hierarchical multiple regressions. All statistical tests are run in SPSS23 using the PROCESS plug-in (developed by Andrew F. Hayes [www.afhayes.com]) for its multistage estimation features and automatic mean centering of appropriate variables. Empirical support for these hypotheses is evidenced by a significant change in $R^2$ values ($\Delta R^2$) between a model that includes all predictors except the relevant interaction terms and a subsequent model in which interaction terms are added (Whisman and McClelland 2005). Although the coefficients from significant models are tabled, they are less-intuitive indicators of interactive relationships than are slope visualizations (see Aiken and West 1991). As such, visualizations are used to guide the interpretation of results.

## Methods

### Data Collection

Survey data used in this study come from the AARP 2016 Survey on Mental Well-being fielded among American adults between March 3 and March 6, 2016 using GfK International's online probability-based panel. Recruitment for the panel is done by phone to

assure random selection. All survey responses are via online mode. Selected respondents who initially lacked the hardware and/or connection to respond online were provided it, so as to remain a true probability panel. The sample consisted of Americans age 18 and older ($N = 2601$), and full sample estimates have a standard error of $\pm 2$. It should be noted that the survey was not fielded chiefly for the purpose of testing questions related to stress and R/S practices but to look at a variety of behaviors and their relationships with health and well-being measures.

## Dependent Measure

The instrument used to assess mental well-being, the Warwick-Edinburgh Mental Well-Being Scale (WEMWBS), is a relatively broad indicator of mental well-being developed to assess the construct in general populations (Carpentieri et al. 2016; Tennant et al. 2007). It consists of 14 positively worded statements (e.g., "I've been able to make up my mind about things," "I've been feeling good about myself," "I've been feeling close to other people" etc.) with five response options related to how often during the previous two weeks the statement would accurately reflect the respondents' actual situation or state of mind (i.e., 1 = "None of the time," 2 = "Rarely," 3 = "Some of the time," 4 = "Often," 5 = "All of the time"). The WEMWBS net score is a simple sum of the scores on the 14 items with a resulting minimum score of 14 (lowest mental well-being) to 70 (highest mental well-being). The mean for the sample was 51.60 (SD = 10.02).

## Independent Measures

### *Frequency of Private Prayer*

Frequency of prayer was measured by an item asking "About how often do you spend time praying, outside of religious services?" Responses were coded: 0 = never (24.4%), 1 = less than a couple of times a week (25.6%), 2 = a few times a week but not daily = (14.1%), and 3 = once a day or more (36%) (Mean = 1.6, SD = 1.2).

### *Frequency of Worship Service Attendance*

Worship was measured by an item asking "In a typical month, how often do you attend a place of religious worship or spiritual practice?" Responses were coded: 0 = not at all (53.7%), 1 = once (12.2%), 2 = about two or three times (8.5%), 3 = about once a week (19%), 4 = two to six times per week (5.9%), 5 = every day (0.8%) (Mean = 1.14 SD = 1.41). Partitioning for non-worshipper and worshipper subgroups was between the "0 = never" (non-worshippers) category and the remaining categories (worshippers).

### *Life Event Stressors*

Life event stressors were the simple sum of "Yes" responses to a multipart item asking "Have you experienced any of the following life stresses in the past year?" The stressors included: (1) marital separation or divorce, (2) job loss, (3) major family conflict, (4) a major personal injury or illness, (5) a loss or major injury of a spouse or close family member, and (6) any other major life stress?. Fifty-one percent of the sample reported no

stressors. Ten percent of the sample reported having more than two (Mean = .89, SD = 1.2).

*Interaction Terms*

Three-way interaction models included the product of frequency of prayer, the life event stressor measure, and frequency of worship service attendance as a predictor. For two-way interaction models, the interaction term was frequency of prayer multiplied by the life event stressor measure.

*Potential Confounds*

There are ten (10) potential confound measures. Six were based on items prefaced by "Which of the following activities do you regularly do?": If "yes" was answered in relation to the following activities, a value of "1" was given. In tables, these binary controls are preceded by the word "regularly," whereas the remaining items are quasi-continuous or based on true scales, as described. The ten potential confounds fall into three main classes including *measures controlling for other religious/spiritual practices*—(1) regularly engaging in mindful activities such as meditation (Mean = 0.14, SD = 0.35) and (2) regularly practicing yoga (Mean = 0.06, SD = 0.24), *measures controlling for healthy lifestyles*—(3) alcohol consumption based on a seven-point quasi-continuous measure related to the estimated number of alcohol drinks one has per day "0" = "No drinks" (46% of sample) and "6" = "more than four drinks per day" (1.1% of sample) (Mean = 0.94, SD = 1.25), (4) aerobic exercise based on a six-point quasi-continuous measure asking how often one exercises with an elevated heart rate per week "0" = "not at all" (28% of sample) and "5" = "7 days a week" (3% of sample) (Mean = 1.68, SD = 1.43), (5) regularly eating a healthy diet (Mean = 0.43, SD = 0.50), (6) a binary "optimal sleep" measure coded "1" if respondent reports generally getting 7 or 8 h of sleep per night and "0" if not (Mean = 0.54, SD = 0.49), and c) *measures related to mental acquisitive and social engagement measures*—(7) regularly volunteering or helping others (Mean = 0.32, SD = 0.47), (8) reading for pleasure based on a four-point quasi-continuous measure asking number of hours spent reading for pleasure per day "0" = "none" (19% of sample) and "3" = "two or more hours a day" (10% of sample) (Mean = 1.25, SD = 0.89), (9) socializing based on a four-point quasi-continuous measure asking how often respondent goes out with family and friends "0" = "never" (4% of sample) and "3" = "often" (24% of sample) (Mean = 1.92, SD = 0.80), and (10) regularly learning new things (Mean = 0.47, SD = 0.50).

## Demographics

Age in years was continuous (Mean = 47.1, SD = 17.4) and was also squared owing to the curvilinear relationship between age and psychological well-being. Among the binary measures, single dummies were used for region in which 1 = Southern state (Mean = 0.37, SD = 0.48), for gender 1 = female (Mean = 0.52, SD = 0.50), marital status 1 = married, not separated (Mean = 0.51, SD = 0.50), first quartile income 1 = up to $34,999 (Mean = 0.26, SD = 0.44), education 1 = college graduate or beyond (Mean = 0.30, SD = 0.46). Additionally, three variables were used for race/ethnicity in the regressions. The reference category was 1 = white, not Hispanic (Mean = 0.66,

SD = 0.48). The binary race/ethnicity measures entered in the models were: Hispanic ethnicity (Mean = 0.15 = 6, SD = 0.36), African-American, not Hispanic (Mean = 0.12, SD = 0.32), and all other/multiraces, but not Hispanic (Mean = 0.07, SD = 0.26). Finally, the use of a single work status dummy leads to multicollinearity problems with age and age (squared). A solution used the following coding: Reference category = Not working, but in the workforce (Mean = 0.14, SD = 0.35) with a dummy for 1 = Out of the labor force (Mean = 0.28, SD = 0.45) and 1 = Currently working (Mean = 0.58, SD = 0.49).

## Results

Table 1 presents summary measures and the final-stage coefficients for the two moderation models in which interaction terms were significant.

The first model summarized in Table 1 is related to a hierarchical multiple regression using the full sample (generalizable to American adults) that includes a three-way interaction between stressors, worship service attendance, and private prayer. The second model is a hierarchical multiple regression limited to the worshipper subgroup that includes a two-way interaction between stressors and prayer. A significant three-way interaction is noted in the first model, and a significant two-way interaction is noted in the latter. There was no significant interaction between stressors and prayer in the non-worshipper model (not shown).

The interpretation of these interactions may benefit from considering the models in sequence. First, two preliminary models (not shown) were run in which the two-way interaction of (a) stressors and prayer and (b) stressors and worship failed to attain significance in the full population. This suggests that the levels of worship (and the levels of prayer) in which Americans engage do not, in and of themselves, moderate the effect of stressors upon mental well-being. Related population-based findings are noted in Jung (2013) and Krause (2009).

Failing to note significant two-way interactions in the larger population, a model including a three-way interaction term between life event stressors, frequency of worship service attendance, and frequency of prayer was run. The significance of the interaction term in this model (see left column Table 1) indicates that significant stress-moderation effects related to frequent worship attendance are observed only for Americans engaging in relatively frequent private prayer. In short, the stress-moderating potential of worship service attendance in America appears to only be actuated for those engaging in prayer beyond a certain frequency threshold.

When the sample was partitioned between non-worshippers and worshippers, a significant interaction between frequency of prayer and life event stressors was noted, although only for the worshipper subgroup (right column, Table 1). This suggests that private prayer has no significant stress-moderating effect on mental well-being for non-worshippers but, among worshippers, more frequent prayer moderates the impact of stress under higher-stress conditions.

For both presented models, positive coefficients related to the interaction terms affirm prayer's role in actuating the stress-moderating capacities of worship service attendance. Significant or not, interaction terms and their effects are hard to conceptualize and this can lead to a sense that conclusions based upon them are unclear or overstated (Whisman and McClelland 2005). Graphical representations of interaction terms and their effects may

**Table 1** Standardized (and unstandardized) coefficients from hierarchical multiple regressions

| | Full sample | Worshippers |
|---|---|---|
| Stressors*prayer*worship | **0.484 (0.240)*** | – |
| Stressors*prayer | 0.477 (.313)* | **0.818 (0.596)**** |
| Stressors*worship | −0.368 (−0.219) | – |
| Prayer*worship | −0.054 (−0.320) | – |
| Life event stressors | −1.872 (−1.571)*** | −1.836 (−1.506)** |
| Prayer frequency | 0.743 (0.619)** | 0.774 (0.621)* |
| Worship service attendance | 0.069 (0.049) | – |
| Regularly "mindfulness\meditation" | 0.394 (1.113)* | 0.391 (1.173)* |
| Regularly "practices yoga" | 0.104 (0.428) | 0.202 (0.474) |
| Alcohol consumption | 0.018 (0.141) | −0.184 (−0.162) |
| Aerobic exercise scale | 0.809 (0.565)*** | 0.486 (0.324) |
| Regularly "eats a healthy diet" | 1.035 (2.088)*** | 0.969 (1.961)*** |
| Gets 7–8 h of sleep per night | 0.815 (1.634)*** | 0.804 (1.586)*** |
| Regularly "volunteers or helps others" | 0.632 (1.358)** | 0.497 (1.111)* |
| Reading for pleasure scale | 0.376 (0.419)* | 0.491 (0.595) |
| Socializing scale | 2.593 (3.254)*** | 2.273 (2.872)*** |
| Regularly "learns new things" | 3.360 (1.678)*** | 1.301 (2.654)*** |
| Age (in whole years) | 0.061 (1.065) | 3.044 (0.171) |
| Age squared | 0.087 (0.001) | −2.193 (−0.001) |
| Southern region 1 = Y | 0.284 (0.587) | 0.275 (0.483) |
| Male/female 1 = F | −0.136 (−0.261) | 0.079 (0.075) |
| Marital status 1 = married, not separated | 0.468 (0.938)* | 0.289 (0.592) |
| First quartile income 1 = up to $34,999 | −0.184 (−0.422) | 0.281 (0.586) |
| Education 1 = college graduate or more | −0.344 (−0.157) | 0.081 (0.265) |
| *Race: white, non-Hispanic (reference)* | | |
| African–American, not Hispanic | 0.654 (2.035)*** | 0.529 (1.438)** |
| Hispanic, any race | 0.566 (1.564)** | 0.668 (1.831)** |
| All other/2 races, not Hispanic | −0.025 (−0.552) | −0.154 (−0.591) |
| *Work status: not working, but in the workforce (reference)* | | |
| Working full time or part time | 0.482 (0.978)* | 0.793 (1.656)* |
| Out of the labor force | 0.189 (0.422) | 0.844 |
| *Summary variables and partials* | | |
| Constant | 51.544 | 52.122 |
| $R^2$ | 0.333*** | 0.305*** |
| **F (Sig. $\Delta R^2$)** | **4.501*** | **7.641**** |
| Number of observations | 2601 | 1205 |

Statistically significant values are in bold

* $p < .05$, ** $p < .01$. *** $p < .001$ (two-tailed)

present relationships more intuitively and help to support conclusions (Aiken and West 1991).

Visualizations of the effect of differing levels of private prayer at differing levels of worship service attendance are presented in Fig. 3. In general, at successive levels of

worship, the relationship between mental well-being and the combination of two measures—level of prayer and level of stressors—changes. Initially, at lower levels of worship, increasing stressors reduce mental well-being scores at the same rate for three selected levels of prayer (i.e., one standard deviation below the mean ["low"], the mean, and one standard deviation above the mean ["high"]). At the mean level of worship, mental well-being scores begin to decline more steeply for those with a low level of prayer than for those with high levels of prayer, as stressor levels increase. At high levels of worship, the decline for those with low levels of prayer is dramatically steeper than those with high levels of prayer. As a whole, high levels of prayer are associated with a relatively moderate decline in mental well-being at higher levels of stressors. Relatedly, declines in mental well-being scores are steeper for those with low levels of prayer at each successive level of worship. Considering this pattern, the weight of evidence related to Hypothesis 1—"is there a significant interaction between stressors, frequency of prayer and frequency of worship?" warrants an affirmative reply and, in practical terms, suggests that worship service attendance requires the necessary complement of private prayer for it to effectively moderate the negative impact of stressors at the population level.

Figure 4 is a visualization of prayer's stress-moderating effect among a subgroup of worshippers. What is not visualized, but is again worth noting, is that no stress-moderating

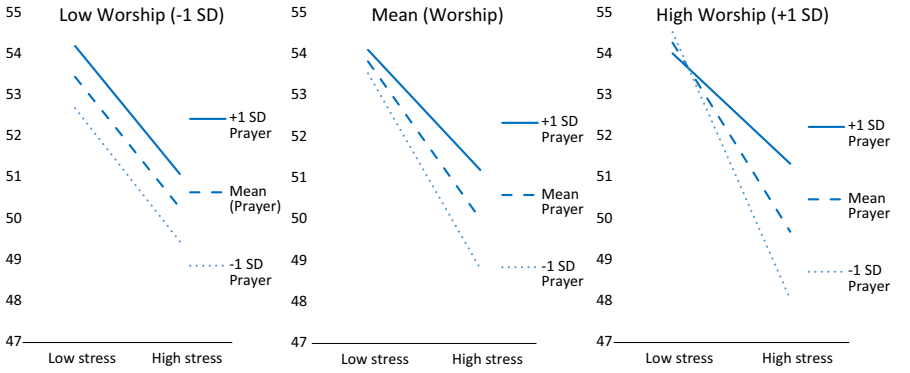


**Fig. 3** Visualizations of three-way interactions of stress, prayer, and worship on mental well-being

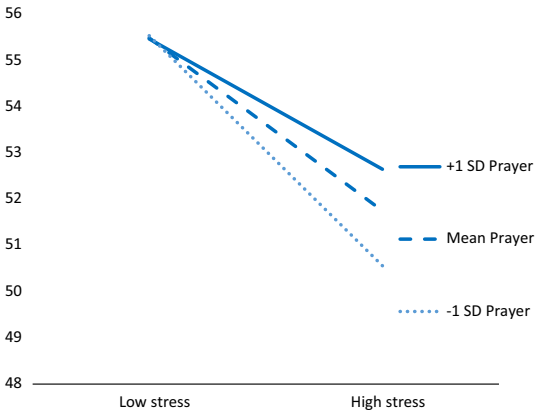


**Fig. 4** Visualization of two-way interaction of stress and prayer on mental well-being among worshippers

effect for prayer was noted among non-worshippers. Among the worshipper subgroup, when moving from low to high stress conditions, a relatively dramatic decline in mental well-being scores is observed among those with low levels of prayer. The weight of the evidence related to Hypothesis 2—does prayer have a significant stress-moderating impact among those already engaged in regular worship service attendance?" again warrants an affirmative reply and, in practical terms, suggests that frequent private prayer moderates stress, but only for worshippers.

## Discussion

A model was proposed in which worshippers are exposed to pro-social content that, when internalized by private prayer, leads to a less-distressing appraisal of life stressors. Regressions yielded outcomes consistent with this model although the use of cross-sectional data may limit confidence in the findings. However seriously data concerns and causal order considerations may need to be taken (given that R/S practices are generally seen as preceding their health outcomes), an area of greater concernment relates to the practical application of the research findings in an era of decreasing traditional R/S involvement (George et al. 2002; Zhang 2016).

The main issue is that optimal stress-moderation dynamics were found under conditions representing a very rigorous devotional regimen (i.e., high levels of worship service attendance and high levels of private prayer) but given a general decline in religious involvement in the USA, the fact that religion and spirituality are not universally palatable, and R/S practices occasionally running counter to the public health (Pew Research Center 2015; Speed and Fowler 2016; Van Ness 1999), it is doubtful such regimens will be increasingly adopted by Americans.

If Americans fail to adopt or retain traditional R/S practices, could the stress-moderating functions of worship and prayer be met with secular analogs? In terms of function, worship service attendance is viewed as repeatedly exposing attendees to pro-social content. Pro-social content is not the exclusive province of houses of worship and may readily be encountered and reinforced through involvement in service organizations, lodges, ethical/philosophical societies, recovery groups, or any other values- or mission-driven social group.

Additionally, the function of private prayer in this study—a means of internalizing pro-social content—may be met through religion-derived or wholly secular practices (e.g., mindfulness meditation, relaxation methods, contemplative practices, etc.) providing a workable secular alternative. In combination, these secular analogs to worship and prayer could, in theory, have similar stress-moderating outcomes as the interrelated traditional R/S behaviors in this study (i.e., worship and prayer).

The claim that secular analogs may function like traditional R/S behaviors to moderate stress is speculative. To some degree, there are reasons to be doubtful of the claim. First, the groups in which pro-social content may be reinforced (e.g., service organizations, lodges, etc.) as well as instruction in secular contemplative practices (e.g., mindfulness meditation) may be harder to access than traditional religion-based resources. Additionally, the sheer volume of content and devotional instruction within religious and spiritual traditions may make the source materials and prescribed rites of an alternative secular regimen comparably less potent. That is, compared to such traditions, secular content may not

be broad enough to access teachings or principles applicable to one's specific life event stressors.

In sum, it is not certain if secular analogs to traditional R/S practices can be combined to form a regimen that leads to the stress-moderating effects found for those attending worship services and engaging in private prayer relatively frequently. Whatever the case, for a regimen of secular analogs to moderate stress, one would need to show some ongoing commitment to two complementary behaviors (one behavior that emulates the function of frequent worship service attendance and another behavior that emulates the function of frequent private prayer).

**Compliance with Ethical Standards**

**Conflict of interest** G. Rainville declares no conflicts of interest.

**Informed Consent** Informed consent was obtained from all individual participants included in the study.

## References


Aiken, L. S., & West, S. G. (1991). *Multiple regression: Testing and interpreting interactions*. Newbury Park, CA: Sage.

Berkman, L. F., & Syme, S. L. (1979). Social networks, host, resistance, and mortality: A nine-year follow-up study of Alameda County residents. *American Journal of Epidemiology, 109,* 186–204. doi:10.1093/oxfordjournals.aje.a112674.

Carpentieri, J. D., Elliott, J., Brett, C. E., & Deary, I. J. (2016). Adapting to aging: Older people talk about their use of selection, optimization, and compensation to maximize well-being in the context of physical decline. *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences, 72,* 351–361. doi:10.1093/geronb/gbw132.

Ellison, C. G., Boardman, J. D., Williams, D. R., & Jackson, J. S. (2001). Religious involvement, stress, and mental health: Findings from the 1995 Detroit Area Study. *Social Forces, 80,* 215–249. doi:10.1353/sof.2001.0063.

Emery, E. E., & Pargament, K. I. (2004). The many faces of religious coping in late life: Conceptualization, measurement, and links to well-being. *Ageing International, 29,* 3–27. doi:10.1007/s12126-004-1007-2.

Ensel, W. M., & Lin, N. (1991). The life stress paradigm and psychological distress. *Journal of Health and Social Behavior, 32,* 321. doi:10.2307/2137101ensel.

Fairchild, A. J., & MacKinnon, D. P. (2008). A general model for testing mediation and moderation effects. *Prevention Science, 10,* 87–99. doi:10.1007/s11121-008-0109-6.

George, L. K., Ellison, C. G., & Larson, D. B. (2002). Explaining the relationships between religious involvement and health. *Psychological Inquiry, 13,* 190–200. doi:10.1207/s15327965pli1303_04.

Gillum, R. F. (2006). Frequency of attendance at religious services and leisure-time physical activity in American women and men: The third national health and nutrition examination survey. *Annals of Behavioral Medicine, 31,* 30–35. doi:10.1207/s15324796abm3101_6.

Hackney, C. H., & Sanders, G. S. (2003). Religiosity and mental health: A meta-analysis of recent studies. *Journal for the Scientific Study of Religion, 42,* 43–55. doi:10.1111/1468-5906.t01-1-00160.

Hettler, T. R., & Cohen, L. H. (1998). Intrinsic religiousness as a stress-moderator for adult Protestant churchgoers. *Journal of Community Psychology, 26,* 597–609. doi:10.1002/(sici)1520-6629(199811)26:6<597:aid-jcop6>3.0.co;2-m.

Ijaz, S., Khalily, M. T., & Ahmad, I. (2017). Mindfulness in Salah Prayer and its association with mental health. *Journal of Religion and Health*. doi:10.1007/s10943-017-0413-1.

Jung, J. H. (2013). Religious attendance, stress, and happiness in South Korea: Do gender and religious affiliation matter? *Social Indicators Research, 118,* 1125–1145. doi:10.1007/s11205-013-0459-8.

Jung, J. H. (2015). Sense of divine involvement and sense of meaning in life: Religious tradition as a contingency. *Journal for the Scientific Study of Religion, 54,* 119–133. doi:10.1111/jssr.12170.

Koenig, H. (2009). Research on religion, spirituality, and mental health: A review. *Canadian Journal of Psychiatry, 54,* 283–291.

Krause, N. (2009). Lifetime trauma, prayer, and psychological distress in late life. *International Journal for the Psychology of Religion, 19,* 55–72. doi:10.1080/10508610802471112.

Krause, N., & Hayward, R. D. (2012). Prayer beliefs and change in life satisfaction over time. *Journal of Religion and Health, 52,* 674–694. doi:10.1007/s10943-012-9638-1.

Ladd, K. L., & Spilka, B. (2006). Inward, outward, upward prayer: Scale reliability and validation. *Journal for the Scientific Study of Religion, 45,* 233–251. doi:10.1111/j.1468-5906.2006.00303.x.

Lakey, B., & Cohen, S. (2000). Social support theory and measurement. In S. Cohen, L. G. Underwood, & B. H. Gottlieb (Eds.), *Social support measurement and intervention: A guide for health and social scientists* (pp. 29–52). New York: Oxford University Press. doi:10.1093/med:psych/9780195126709.003.0002.

Ledesma, D., & Kumano, H. (2009). Mindfulness-based stress reduction and cancer: A meta-analysis. *Psycho-Oncology, 18,* 571–579. doi:10.1002/pon.1400.

Mah, L., Szabuniewicz, C., & Fiocco, A. J. (2016). Can anxiety damage the brain? *Current Opinion in Psychiatry, 29,* 56–63. doi:10.1097/yco.0000000000000223.

Masters, K. S., & Spielmans, G. I. (2007). Prayer and health: Review, meta-analysis, and research agenda. *Journal of Behavioral Medicine, 30,* 329–338. doi:10.1007/s10865-007-9106-7.

Newberg, A. (2010). *Principles of neurotheology*. Farnham: Ashgate.

Pandya, S. (2015). Pilgrimage and devotion to the divine mother: Mental well-being of devotees of Mata Vaishno Devi. *Mental Health, Religion & Culture, 18,* 726–737. doi:10.1080/13674676.2015.1112771.

Pargament, K. (2002). Is religion nothing but…?: Explaining religion versus explaining religion away. *Psychological Inquiry, 13,* 239–244. doi:10.1207/s15327965pli1303_06.

Pew Research Center. (2015). *U.S. public becoming less religious.*

Pew Research Center (2016). *Religion in everyday life*.

Richardson, E. M., Schüz, N., Sanderson, K., Scott, J. L., & Schüz, B. (2016). Illness representations, coping, and illness outcomes in people with cancer: A systematic review and meta-analysis. *Psycho-Oncology, 26,* 724–737. doi:10.1002/pon.4213.

Smith, H. (1991). *The world's religions*. San Francisco, CA: HarperSanFrancisco.

Speed, D., & Fowler, K. (2016). Good for all? Hardly! Attending church does not benefit religiously unaffiliated. *Journal of Religion and Health, 56,* 986–1002. doi:10.1007/s10943-016-0317-5.

Stark, R., & Finke, R. (2000). *Acts of faith: Explaining the human side of religion*. Berkeley, CA: University of California Press.

Tait, R., Currier, J. M., & Harris, J. I. (2014). Prayer coping, disclosure of trauma, and mental health symptoms among recently deployed United States veterans of the Iraq and Afghanistan conflicts. *The International Journal for the Psychology of Religion, 26,* 31–45. doi:10.1080/10508619.2014.953896.

Tennant, R., Hiller, L., Fishwick, R., Platt, S., Joseph, S., Weich, S., et al. (2007). The Warwick-Edinburgh Mental Well-being Scale (WEMWBS): Development and UK validation. *Health and Quality of Life Outcomes, 5,* 63. doi:10.1186/1477-7525-5-63.

Van Ness, P. H. (1999). Religion and public health. *Journal of Religion and Health, 38,* 15–26. doi:10.1023/a:1022959731396.

Whisman, M. A., & McClelland, G. H. (2005). Designing, testing, and interpreting interactions and moderator effects in family research. *Journal of Family Psychology, 19,* 111–120. doi:10.1037/0893-3200.19.1.111.

Zhang, L. (2016). An age–period–cohort analysis of religious involvement and adult self-rated health: Results from the USA, 1972–2008. *Journal of Religion and Health, 56,* 916–945. doi:10.1007/s10943-016-0292-x.