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Daily Religious Coping Buffers the Stress-Affect Relationship and Benefits Overall Metabolic Health in Older Adults

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Abstract

This study focuses on how daily religious coping mitigates daily stress, regulates emotional responses, and ultimately produces more optimal health outcomes. Participants were 267 community-dwelling older adults from the Later Life Cohort of the Notre Dame Study of Health & Well-being (mean age=72; 63% female). Daily diary data (56 days) were used to assess the effects of daily perceived stress, daily religious coping, and their interaction on daily negative affect. Multi-level modeling (MLM) results suggested that religious coping regulated the effects of stress on negative affect ($\beta=0.02$; $p<.01$). The intraindividual variability in these day-level effects represent specific dynamic aspects of the individual, referred to as *dynamic characteristics*. These person-level dynamic characteristics derived from the MLM were correlated with indicators of metabolic health, and predicted healthier values. Most significantly, the stress buffering effects of Religious Coping predicted better metabolic health, as indicated by negative correlations with glucose tolerance (A1c; $r=-0.32$, $p<.001$) and the Obesity composite variable ($r=-0.23$, $p=.01$). Results demonstrate that the ability to use religious coping to regulate the effects of stress on negative affect may delay the onset of disorders associated with obesity and dysregulation in the metabolic system.

Keywords

Religion; Metabolic Health; Dynamic Characteristics; Stress; Aging

The ability to cope with, or be resilient to, stress is an important component of living well. One mechanism for dealing with the pernicious effects of stress is faith—particularly aspects of one’s religious or spiritual belief system that can help to protect an individual during times of adversity. One way to assess this is to look at the ways in which religious and spiritual resources work at the daily level; that is, how do individuals use their daily faith practices and beliefs to attenuate the effects of stress on negative affect? Furthermore, does the ability to use these resources to mitigate stress represent dynamic characteristics of the individual that can then be used to predict health outcomes? The purpose of the current study is two-fold: 1) establish the effects of daily religious coping on the daily stress-

negative affect relationship; and 2) use the faith resource characteristics garnered from the daily analysis to predict metabolic health indicators associated with obesity-related disease processes such as Type 2 Diabetes.

Religious Coping, Stress, and Well-Being

Indicators of religiousness are consistently linked with positive psychological well-being and better physical health (see Koenig, 2012 for a review). The link between religiousness and mental and physical health is often discussed in the context of *coping*, in which the faithful utilize resources provided by their belief system to deal with the stresses of life, including establishing an awareness of meaning and purpose (Park, 2005), developing a sense of hope and optimism (Koenig, 2012), enhancing perceptions of control (Jackson & Bergeman, 2011) or accessing the social and emotional support that is available through religious networks (Koenig, 2012). Within the *stress and coping framework* (Lazarus & Folkman, 1984), these faith-based assets can act in two ways: first, they can help the believer adjust his or her assessment, or *appraisal*, of the situation, perhaps viewing it as an opportunity or a challenge rather than a threat; second, they can serve as *coping resources* to which the believer turns when he or she appraises a situation as stressful. Here, we are interested in the extent to which individuals utilize religious coping resources to effectively manage daily levels of perceived stress, as well as how an individual's day-in, day-out religious coping pattern influences his or her overall metabolic health. For the purposes of the present study, we define *religious coping* as the extent to which individuals use their religious beliefs and experiences to cope with stress, to provide strength and comfort, or to enhance well-being via a connection to the transcendent. As this definition makes clear, we are focusing on positive religious coping here, as opposed to negative religious coping, which tends to involve appraisals and coping behaviors based on insecurity, fear, and struggle related to religious belief (Pargament, Smith, Koenig, & Perez, 1998). It is also important to note that religious coping here encompasses the spirituality typically inherent within a religious faith, but does not attempt to capture or address broader spirituality outside of religious faith; it is for this reason that we refer to "religious coping" rather than "religious and spiritual coping".

Considering religious coping generally, the existing literature is mixed: first, there are studies investigating the use of religious coping in samples facing specific stressors, which often find religious coping indicators or proxies (e.g., frequency of prayer) to be associated with greater distress. Although on the surface this would indicate the ineffectiveness of religious coping, these studies tend to be cross-sectional and therefore likely capture the reality that when religious individuals are experiencing more distress, they rely on religious coping resources more heavily (Koenig, King, & Carson, 2012). Other studies have found more beneficial effects. In his review, Koenig (2012) reports that the "overwhelming majority" (p.4) of 454 published studies investigating the use of religious and spiritual resources in the context of coping with adversity (e.g., disease, bereavement, natural disasters, terrorism, overall stress) found beneficial effects on well-being. More recent work continues to uncover positive associations; for example, a study of Jewish adults found positive religious coping (supportive, adaptive use of religious resources) to predict higher subjective well-being (Rosmarin, Pirutinsky, Carp, Appel, & Kor, 2017). A qualitative study

investigating the role of personal faith in older adults' adjustment to a religious stressor (churches closing) also found stronger personal faith to predict more positive appraisals of the stressful situation and more positive well-being through the transition (Trueman & Gould, 2017).

Daily Religious Coping

The majority of existing studies examine religious coping on the global level, identifying general associations that may or may not reflect the role of religiousness and spirituality in the day-to-day lives of the faithful. Thus, one limitation of current research is the lack of information regarding the day-in, day-out process by which aspects of religious or spiritual experiences produce a health benefit. One way to illuminate these crucial pathways is to use experience sampling methods (Conner, Barrett, Tugade, & Tennen, 2007), which assess processes as they unfold, and to capture the "lived" experience of everyday life (Wheeler & Reis, 1991). A good example of diary methods in the context of spiritual coping comes from the Notre Dame Study of Health & Well-Being (Whitehead & Bergeman, 2012), which used multilevel modeling to investigate the role that everyday spiritual experiences played in helping older adults cope with daily stresses, and in particular how these spiritual experiences aid in emotion regulation. Results showed that having more spiritual experiences on a given day buffered the deleterious impact of that day's level of perceived stress on that day's negative affect, providing evidence for the buffering effect of everyday spiritual experiences.

A few other studies have investigated religious coping on the daily or weekly level, with mixed results: an 8-week, weekly study investigating religious coping in Christian college students did not find a significant effect for positive religious coping on stress (Ahles, Mezulis, & Hudson, 2016); however, a more classic study conducted in the context of arthritis found individuals who reported more frequent daily spiritual experiences to have more positive well-being and report less joint pain (Keefe et al., 2001). This combination of results points to the important role that faith plays in people's day-to-day lives, and highlights the need for additional day-level research to further elucidate how religion and spirituality confer health and well-being benefits.

The Value of Dynamic Characteristics

Data from daily diary studies can be used to better understand individuals' likelihood of behaving in particular ways, as indicated by the variation of behaviors expressed across randomly encountered contexts (here, a time series across 56 days). These indicators represent what Ram and Gerstorf (2009) call *dynamic characteristics*, which are 'trait'-like descriptions of an individual's inherent capacity for change as he or she experiences endogenous or exogenous influences that are not structured, at least in relation to time. Dynamic characteristics represent attributes that change as a function of context; examples include *plasticity* (the extent to which behavior can be shaped or modified) or *resilience* (the ability to maintain functionality in the face of adversity). In other words, the extent to which an individual varies on a given construct across days (intraindividual variability) represents a dynamic characteristic of that person's lived experience. In the current analysis, the primary

dynamic characteristic of interest is the extent to which individuals use religious coping resources to buffer the detrimental effects of perceived stress on negative affect on the daily level; a person-level value for this characteristic is given by the beta coefficient representing the interaction effect of the time-varying covariate (daily stress X daily religious coping) in the multi-level model. These person-level dynamic characteristics, derived from the day-level experience, can then be used to predict the broader metabolic health outcomes of interest here.

Faith and Indicators of Metabolic Health

The degree to which one's metabolism is functioning properly is strongly indicative of overall health and a reduced risk of both cardiovascular disease and diabetes. Although single indicators of metabolic function are informative, research has indicated that having unhealthy levels of multiple metabolic indicators is especially predictive of morbidity and mortality (Muntner, He, Chen, Fonseca, & Whelton, 2004; Seeman et al., 2010). The risk for heart disease, diabetes, and stroke increases with the number of metabolic risk factors one has, making it important to consider multiple aspects of metabolic function when investigating health outcomes. The current investigation will assess indicators relating to the obesity aspect of metabolic health—specifically, waist-to-hip ratio, body mass index (BMI), and glucose intolerance (A1c), along with a composite obesity variable.

For diabetes and obesity indicators, research on religion's impact is mixed, calling for additional studies on the topic; overall, there is indication that blood glucose levels are positively influenced, but that religion can be associated with worse external obesity measures such as body mass index (BMI) and waist-hip ratio. A classic study found meditation to positively influence glucose metabolism (Hertzog, et al., 1990–1991), and more frequent church attendance has been related to decreased likelihood of having diabetes and hypertension (van Olphen, et al., 2003). This latter finding was partially mediated by church-related social support. In women already diagnosed with Type 2 diabetes, religion and spirituality demonstrated significant relationships with glycemic control, with religious well-being decreasing control (a detrimental outcome) and existential (spiritual) well-being increasing control (Newlin, 2007). These results held, even after adjusting for demographic variables, BMI and diabetes medications. Considering external obesity indicators, one study found church attendance, social support from religious sources, religious commitment and religious identity to be related to higher body mass index (BMI), especially in men (Kim, Sobel & Wethington, 2003). This relation disappeared, however, when smoking rates were taken into account, with the most religious being the least likely to smoke. Race and gender may also play a role in these effects: a forthcoming study found religious attendance to have a protective or neutral association with body mass in White women, but a detrimental association in Black women; there was no association in men (Godbolt, Vaghela, Burdette, Hill; 2018).

One recent prospective study found that greater religious participation is associated with lower cholesterol, healthier waist-hip ratio, and lower allostatic load (Hill, Rote, & Ellison, 2017), indicating that previous findings in the opposite direction may be correlational rather than causal. A study looking specifically at older adults also found higher rates of religious

attendance to be linked with lower body mass and reduced allostatic load (Hill, Rote, Ellison, & Burdette, 2014). A positive effect was also found in a sample of Jewish participants, as religious coping served to moderate the negative impact of poor emotional functioning on obesity (BMI) so that those who utilized positive religious coping did not display weight gain in response to their emotional distress (Pirutinsky, Rosmarin, & Holt, 2012). Along with assessing blood glucose (A1c), the current study will focus on indicators of obesity that are related to stress (e.g., waist-to-hip ratio to assess weight that is stored as belly fat) to better delineate the role of faith in buffering the stress-related precursors of metabolic health.

Present Study and Hypotheses

Of greatest interest in the current investigation are the ways in which daily indicators of religious coping are used as resilience resources to mitigate daily stress, regulate emotional responses, and ultimately produce more optimal health outcomes. Using daily diary data from a 56-day time series, multilevel models will assess the direct effects of perceived stress and religious coping on negative affect (NA), as well as the moderating effect of the two in combination (perceived stress x religious coping); we expect that religious coping will buffer the daily stress-NA association. Correlation analysis will test the association between the day-level parameters (dynamic characteristics) and three different indicators of metabolic health (waist-hip ratio, BMI, A1c), along with a composite obesity variable. Based on existing research, we hypothesize that those individuals who experience the greatest buffering benefit against stress from their faith will have better metabolic health.

Methods

Participants and Procedures

Participants were 267 older adults (mean age = 72 years) from the Notre Dame Study of Health & Well-Being (NDHWB), a longitudinal study exploring the processes and correlates of stress and well-being in middle-aged and older adulthood. Data for the current analyses came from Year 5¹ of the study, when expanded measures of religiousness and spirituality were incorporated into the daily survey. Demographic characteristics for the sample are provided in Table 1. Participants who agreed to participate in a 56-day “burst” of survey assessments in Year 5 of the study received daily surveys in the mail that they completed each night and returned in postage-paid return envelopes supplied by the researchers. Participants received pre-paid Visa cards for their participation (\$10.00 per week completed).

In order to supplement the NDHWB with more objective measures of health in later life, 153 of the participants were also recruited for participation in an in-person health battery in Year 5, which was conducted by a registered nurse. As part of this health assessment, a basic physical exam was conducted to collect blood pressure, heart rate, height/weight, etc. and a

¹The Whitehead and Bergeman, 2012 study described in the introduction used Year 3 daily data from this same sample and the Daily Spiritual Experiences measure to represent spiritualness. The current study uses data from Year 5 and the daily version of the Multidimensional Measurement of Religiousness/Spirituality, which assesses attributes associated with religion and spirituality more broadly.

blood draw was taken to assess hemoglobin A1c. The blood draws were conducted and analyzed by South Bend Medical Foundation (SBMF) in accordance with American Drug Administration regulations and guidelines; subjects received \$100 in exchange for their participation in the health battery, which generally took about 2 hours to complete. All procedures were approved by the Institutional Review Board at the University of Notre Dame.

Measures

Religious Coping.—The Religious Coping items are a subset of 9 items from the Multidimensional Measurement of Religiousness/Spirituality (Fetzer Institute, 1999) that have been revised to allow for daily evaluation (e.g., instructions asked subjects to think about the current day, rather than in general, when responding to questions). The items were chosen to assess the extent to which individuals use their religious beliefs and experiences to cope with stress, to provide strength and comfort, or to enhance well-being via a connection to the transcendent. Example items include, *My faith helped me cope today*; *I found strength and comfort in my spiritual beliefs*; and *I looked to God for strength, support, and guidance*. All 9 items were rated on a 4-point scale (1 = “not at all” to 4 = “very much;” 0 was used for not applicable); internal consistency reliability (Cronbach’s alpha) was 0.93. A higher score reflected greater Religious Coping.

Negative Affect (NA).—Daily negative affect was measured using 10 items from the Positive and Negative Affect Schedule (Watson, et al., 1988). The scale consists of a list of 10 negative affect descriptors for which the individual rates the extent to which he or she feels each emotion in general on a 5-point scale, ranging from *not at all* to *extremely*. Items include words such as afraid, ashamed, hostile, and distressed; higher NA scores indicate greater negative affect. Cronbach’s alpha was 0.94.

Perceived Stress Scale.—Perceived daily stress was measured using 10 items from the Perceived Stress Scale (Cohen, Kamarck & Mermelstein, 1983), which were revised to reflect perceived stress on a single day (e.g., “Today I felt nervous and stressed.”). A four-point Likert scale was used, with a higher score indicating greater levels of stress. The reliability estimate was $\alpha = 0.89$.

Metabolic Health.—Common indicators of stress on health consist of increases in body fat composition measured by waist to hip ratio (calculated based on waist circumference, measured at its narrowest point between the ribs and iliac crest and hip circumference, measured at the maximal buttocks) and Body Mass Index (BMI; a person’s weight in kilograms divided by height in meters squared ($BMI = kg/m^2$)), and decreased glucose tolerance (e.g., glycosylated hemoglobin A1c). In the current analyses, the composite *Obesity* variable—representing body weight factors associated with stress—was comprised of the sum of standardized measures of waist-to-hip ratio, Body Mass Index, and Hemoglobin A1c (higher values = worse health).

Analytic Approach

To test the hypotheses related to the beneficial effects of Religious Coping on the stress-affect relationship, multilevel modeling (MLM; Raudenbush & Bryk, 2002) was used. A major advantage of MLM is their ability to handle missing data (Verbeke & Molenberghs, 2000); likelihood-based (full-likelihood estimation) methods were used to achieve the most accurate estimates. Day-level negative affect was estimated using the following equation:

$$y_{ij}(\text{NA}) = \beta_{0j} + \beta_{1j}(\text{Day}) + \beta_{2j}(\text{Stress}) + \beta_{3j}(\text{Religious Coping}) + \beta_{4j}(\text{Stress X Religious Coping}) + e_{ij} \quad (\text{Equation \# 1})$$

In these analyses, $y_{ij}(\text{NA})$ represented the daily NA score for person j on day i , β_{0j} denoted the random coefficient that represented the intercept of y (a participant's average NA) for person j (across the i days for which each person provided data); $\beta_{1j}(\text{Day})$ was a random coefficient that captured any trend in NA across the 56 days; $\beta_{2j}(\text{Stress})$ was a random coefficient that corresponded to the effects of perceived daily stress on NA; $\beta_{3j}(\text{Religious Coping})$ was a random coefficient that represented the effects of Religious Coping on NA, $\beta_{4j}(\text{Stress X Religious Coping})$ was a random coefficient that stood for the interaction between the stress and Religious Coping on NA; and e_{ij} represented the residual. The mean values for perceived stress and Religious Coping were used at Level 2 to differentiate the between and within effects (Sliwinski, 2010). As is the standard in analyses of this type, all variables were person-centered at Level 1 and group-mean centered at Level 2 to aid in interpretation (Raudenbush & Bryk, 2002).

To test the hypotheses related to the impact of religious coping on metabolic health, the MLMs were specified to assess both fixed and random effects; random effects provide each individual with a coefficient that represents their individual parameter estimates derived from the time series of daily data. In other words, beyond understanding the ways in which daily indicators of religious coping have direct and stress buffering effects on negative affect, the random beta coefficients from MLM can be used to assess how these dynamic characteristics of the individual predict health outcomes. The random coefficients for the Stress, Religious Coping and Stress x Religious Coping effects on NA were output so that each participant had a single value representing these daily effects across all 56 days; correlational analysis then assessed the relationship between these dynamic (day-level) characteristics and metabolic health.

Results

Descriptive Statistics

Means, standard deviations, and correlations with age for all variables are provided in Table 2. Analysis of variance was used to look for any differences by gender, income, or education for all variables of interest. Results indicated that there were significant gender differences for daily stress ($F(1,238) = 2.64; p < .03$) with men scoring lower than women ($M=15.9$ versus 17.2 ; 7% of variance); and Obesity ($F(1,140) = 8.69; p < .01$) with men scoring higher than women ($M=0.68$ versus -0.38 ; 6% of variance). There was also a significant effect of income on daily stress accounting for 2% of the variance ($F(6,225) = 2.64; p < .03$).

with daily stress increasing across income groups until Level 5 (\$40,000-\$74,999) and then decreasing.

Results of Multi-level Modeling

Results of the MLM analyses are reported in Table 3. Religious Coping showed no direct effect on NA, but it did buffer the effects of perceived stress on NA ($\beta=0.02$; $p<.01$). The between group effects (e.g., the mean levels) showed significant results for overall mean stress ($\beta=0.64$; $p<.001$) and Religious Coping ($\beta=0.02$; $p<.00$), indicating that there were large between person differences on NA for average levels of daily stress and Religious Coping.

Correlations between Dynamic Characteristics and Indicators of Metabolic Health

Results of the correlation analysis are shown in Table 4. To control for potential demographic differences that have been found for both the predictors (stress, religiousness) and the outcomes (indicators of obesity), the correlations reported are the partial correlations after the influence of age, gender, income, and education have been accounted for. The stress buffering effects of Religious Coping (the stress x religious coping interaction) predicted better metabolic health, as indicated by the negative correlations with glucose tolerance (A1c; $r = -0.32$, $p < .001$) and the Obesity composite variable ($r = -0.23$, $p = .01$). The coefficient representing the direct effects of Religious Coping on NA was significantly correlated with waist-to-hip ratio ($r = 0.18$, $p = .05$) and A1c ($r = 0.19$, $p = .04$), and at trend level with the composite obesity measure ($r = 0.17$, $p = .06$); the more that religious coping reduced daily NA, the lower the waist-hip ratio measurement, the lower the A1c value, and the lower the overall Obesity variable. The coefficient representing the direct effects of stress on NA was not significantly correlated with the metabolic indicators.

Discussion

Not all individuals exposed to stress and adversity develop psychological disorders or medical diseases. This is due in part to the role of the individual's adaptive assets that intervene in the linkages in the physiological stress process that produce negative health and well-being outcomes (Ong & Bergeman, 2007). One such resource is the beneficial effect of faith on the emotional regulation process. Results from the current study inform this process in two ways. First, it establishes the significant buffering role of religious coping on the daily stress-affect relationship; second, it uses this daily diary data to produce dynamic indicators that can predict metabolic health, indicated by both composite measures and individual components. The union provides an innovative conceptual, methodological, and statistical approach to determine how individuals utilize religious and spiritual resources to maintain quality health despite the inevitable presence of challenge and adversity.

Results indicated that religious coping significantly buffered the detrimental effects of daily stress on daily negative affective response, aligning with stress and coping theory (Lazarus & Folkman, 1984) and supporting research finding a beneficial effect (Koenig, 2012; Rosmarin et al., 2017; Trueman & Gould, 2016). When the dynamic indicators of stress, religious coping, and their interaction resulting from the day-level analysis were used to

predict metabolic health, findings aligned with previous research finding beneficial effects (e.g., Hill et al., 2017; Pirutinsky et al., 2012). The direct effects of religious coping on NA significantly predicted the individual waist to hip ratio and hemoglobin A1c indicators, with both in the healthier direction. The stress buffering effect of religious coping was also related to the obesity components, particularly glucose tolerance (A1c). Note that there were no significant effects for the dynamic characteristics on BMI. Generally speaking, then, daily use of religious coping to buffer the effects of stress on negative affect results in healthier metabolic functioning in our older adult sample.

As in all research, there are potential limitations. First, although the dynamic characteristics were based on a longitudinal time series, the correlational relationships are cross sectional. Although intuitively it makes sense that the stress-buffering effects faith would relate to metabolic health, that relationship could work in the opposite direction, or a third variable could influence this relationship. Longitudinal research will be needed to inform our understanding of this process. The NDHWB sample is comprised primarily of Christian religions, which limits the generalizability of the findings beyond this faith tradition; results may differ across religious affiliations and for non-Christian faiths. We also must acknowledge that some of the effect sizes for the results being reported and interpreted here are small, making it important for future work to establish the reliability of these findings. Despite small effects, the novel approach and strength of data underlying this study give these findings worth and enhance the overall contribution of the project. The sample is also comprised of older adults; because the relative importance of faith may differ with age and across cohorts, it is important to recognize that these findings may not hold for younger generations. Future research should shed light on these potential age versus cohort effects. Finally, it is important to note that we focused on metabolic health here; relationships may differ for other aspects of physical or mental health, a reality which represents an important avenue for future research.

To conclude, the results here shed light on the role that religiousness plays when it comes to everyday stress and overall physical health. By linking day-level religious coping effects with objective indicators of metabolic health, we get a glimpse of how these micro-level factors influence more macro-level health outcomes in older adults. The results reveal a) that religious coping is key in combating adversity, and b) that those who experience the greatest coping benefit from faith tend to have better metabolic health. So, those who utilize their faith as a primary coping resource in the face of daily stresses may reap important health benefits along the way. In addition to spurring future research aimed at further elucidating these processes, this association holds promise for clinical and applied contexts, in which the faith of patients or clients often play a key role in the promotion of mental health (Jameson et al., 2012) and physical health (Bopp, Baruth, Peterson, & Webb, 2013). By utilizing measures of daily religious experience to assess the dynamic ways in which faith-related variables help one to relieve stress at the daily level, and then tying these dynamic characteristics to health outcomes, we have contributed further to the present understanding of how faith influences not only psychological well-being, but physical health and disease processes.

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References

- Ahles JJ, Mezulis AH, & Hudson MR (2016). Religious coping as a moderator of the relationship between stress and depressive symptoms. *Psychology of Religion and Spirituality*, 8(3), 228–234. doi: 10.1037/rel0000039
- Bopp M, Baruth M, Peterson JA, & Webb BL (2013). Leading their flocks to health? Clergy health and the role of clergy in faith-based health promotion interventions. *Family and Community Health*, 36(3), 182–192. doi: 10.1097/FCH.0b013e31828e671c [PubMed: 23718954]
- Cohen S, Kamarck T, & Mermelstein R (1983). A global measure of perceived stress. *Journal of Health and Social Behavior*, 24(4), 385–396. [PubMed: 6668417]
- Conner TS, Barrett LF, Tugade MM, & Tennen H (2007). Idiographic personality: The theory and practice of experience sampling In Robins RW, Fraley RC, & Krueger RF (Eds.), *Handbook of research methods in personality psychology* (pp. 79–96). New York: Guilford Press.
- Fetzer Institute/National Institute on Aging Working Group. (1999, 10). Multidimensional measurement of religiousness/spirituality for use in health research: A report of the Fetzer Institute/National Institute on Aging working group. Kalamazoo, MI: Author.
- Godblot D, Vaghela P, Burdette A, & Hill T (2018). Religious attendance and body mass: An examination of race and gender variations. *Journal of Religion & Health*, 57(6), 2140–2152. doi: 10.1007/s10943-017-0490-1 [PubMed: 28856558]
- Hertzog H, Lele VR, Kuwert T, Langen KJ, Kops ER, & Feinendegen LE, (1990–1991). Changed pattern of regional glucose metabolism during Yoga meditative relaxation. *Neuropsychobiology*, 23, 182–187.
- Hill TD, Rote SM, & Ellison CG (2017). Religious participation and biological functioning in Mexico. *Journal of Aging and Health*, 29(6), 951–972. doi: 10.1177/089826431771624 [PubMed: 28643579]
- Hill TD, Rote SM, Ellison CG, & Burdette A (2014). Religious attendance and biological functioning: A multiple specification approach. *Journal of Aging and Health*, 26, 766–785. doi: 10.1177/0898264314529333 [PubMed: 24733752]
- Jackson B & Bergeman CS (2011). How does religiosity enhance well-being? The role of control. *Psychology of Religion and Spirituality*, 3, 149–161 [PubMed: 24860640]
- Jameson JP, Shrestha S, Escamilla M, Clark S, Wilson N, Kunik M, ... & Stanley M (2012). Establishing community partnerships to support late-life anxiety research: Lessons learned from the calmer life project. *Aging & Mental Health*, 16(7), 874–883. doi: 10.1080/13607863.2012.660621 [PubMed: 22416908]
- Keefe FJ, Affleck G, Lefebvre J, Underwood L, Caldwell DS, ... & Pargament K (2001). Living with Rheumatoid Arthritis: The role of daily spirituality and daily religious and spiritual coping. *The Journal of Pain*, 2(2), 101–110. doi: 10.1054/jpai.2001.19296 [PubMed: 14622831]
- Kim KH, Sobal J, & Wethington E (2003). Religion and body weight *International Journal of Obesity*, 27, 469–477 [PubMed: 12664080]
- Koenig HG (2012). Religion, spirituality, and health: The research and clinical implications. *International Scholarly Research Network Psychiatry*, 2012, 1–33. doi: 10.5402/2012/278730
- Koenig HG, King DE, & Carson VB (2012). *Handbook of Religion and Health*, 2nd Edition. New York: Oxford University Press.
- Lazarus RS, & Folkman S (1984). *Stress, appraisal, and coping*. New York: Springer.
- Muntner P, He J, Chen J, Fonseca V, & Whelton PK (2004). Prevalence of non-traditional cardiovascular disease risk factors among persons with impaired fasting glucose, impaired glucose tolerance, diabetes, and the metabolic syndrome: Analysis of the third national health and nutrition examination survey (NHANES III). *Annals of Epidemiology*, 14(9), 686–695. [PubMed: 15380800]

- Newlin K, (2007). The relationship of religion and spirituality to blood glucose control in Black women with Type II Diabetes (Ph.D. Dissertation, Yale University, New Haven, CT).
- Ong A & Bergeman CS (2007). Resilience and adaptation to stress in later life: Empirical perspectives and conceptual implications. Invited paper for Ageing International, 29, 219–246.
- Pargament KI, Smith BW, Koenig HG, & Perez L (1998). Patterns of positive and negative religious coping with major life stressors. *Journal for the Scientific Study of Religion*, 37(4), 710–724. doi: 10.2307/1388152
- Park CL (2005). Religion as a meaning-making framework in coping with life stress. *Journal of Social Issues*, 61(4), 707–729.
- Pirutinsky S, Rosmarin DH, & Holt CL (2012). Religious coping moderates the relationship between emotional functioning and obesity. *Health Psychology*, 31(3), 394–397. doi: 10.1037/a0026665 [PubMed: 22149124]
- Ram N & Gerstorff D (2009). Time structured and net intraindividual variability: Tools for examining the development of dynamic characteristics and processes. *Psychology and Aging*, 24, 778–791. [PubMed: 20025395]
- Raudenbush S, & Bryk A (2002). Hierarchical linear models: Applications and data analysis methods. Thousand Oaks, CA: Sage Publications.
- Rosmarin DH, Pirutinsky S, Carp S, Appel M, & Kor A (2017). Religious coping across a spectrum of religious involvement among Jews. *Psychology of Religion and Spirituality*, 9(supplement 1), S96–S104. doi: 10.1037/rel0000114
- Seeman TE, Gruenewald TL, Karlamangla AS, Sidney S, Liu K, McEwen B, & Schwartz J (2010). Modeling Multisystem Biological Risk in Young Adults: The Coronary Artery Risk Development in Young Adults Study. *American Journal of Human Biology*, 22, 463–472. [PubMed: 20039257]
- Sliwinski MJ (2010). Approaches to modeling intraindividual and interindividual facets of change for developmental research. In Fingerman K, Berg C, Smith J & Antonucci T (Eds.), *Handbook of Lifespan Development* (pp. 1–26). New York, NY: Springer Publishing Company.
- Trueman L, & Gould ON (2017). The role of religion when crisis looms: A church community at a crossroads. *Journal of Religion, Spirituality, and Aging*, 29(1), 18–32. doi: 10.1080/15528030.2016.1248586
- Van Olphan J, Schulz A, Isreal B, Chatters L, Klem L, Parker E, & Williams D (2003). Religious Involvement, social support and health among African-American women on the east side of Detroit. *Journal of General Internal Medicine*, 18 (7), 549–547. [PubMed: 12848838]
- Verbeke G, & Molenberghs G (2000). Linear mixed models for longitudinal data. New York: Springer-Verlag
- Watson D, Clark LA, & Tellegen A (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology*, 54(6), 1063–1070. [PubMed: 3397865]
- Wheeler L, & Reis H (1991). Self-recording of everyday life events: Origins, types, and uses. *Journal of Personality*, 59, 339–354.
- Whitehead B & Bergeman CS (2012) Coping with Daily Stress: Differential Role of Spiritual Experience on Daily Positive and Negative Affect, *Journal of Gerontology: Psychological Science and Social Science*, 4,456–459.

Table 1.

Demographic Characteristics of the Sample (N = 267).

Demographic Category	Frequency	Percentage
Age (M = 72)		
55–64	7	2.6
65–74	182	68.2
75–84	76	28.5
85–94	2	0.7
Gender		
Female	168	62.9
Male	99	37.1
Race		
Caucasian	227	85.0
African American	27	10.0
Hispanic / Latino	8	3.0
Other	5	2.0
Marital Status		
Married	111	41.6
Widowed	71	26.6
Divorced / Separated	56	21.0
Single	29	10.8
Education (highest attained)		
Middle School	7	2.6
High School	179	67.1
College Degree	46	17.2
Advanced Degree	35	13.1
Income		
< \$7,500	6	2.2
\$7,500–14,999	44	16.5
\$15,000–24,999	60	22.5
\$25,000–39,999	69	25.8
\$40,000–74,999	67	25.1
\$75,000–99,999	12	4.5
\$100,000 +	9	3.4

Table 2.

Means, standard deviations, and correlations with age for the Metabolic Health variables, the Dynamic Characteristics and the Daily Diary data.

Variable	N	Mean	SD	Correlation w/ Age
Metabolic Health Variables				
Obesity Composite	150	0.00	2.10	0.04
Waist:Hip Ratio	151	0.88	0.07	0.16
Body Mass Index	152	29.66	5.80	-0.04
Hemoglobin A1c	152	5.85	0.75	-0.04
Dynamic Characteristics				
Stress	212	0.00	0.20	-0.18*
Religious Coping	212	0.00	0.00	0.10
Stress * Religious Coping	212	0.00	0.04	0.09
Daily Diary Data				
Stress (Day 1)	240	16.75	4.56	-0.01
Negative Affect (Day 1)	239	12.81	4.87	-0.07
Religious Coping	199	27.72	7.86	0.16

Table 3.

Parameter Estimates from Multi-level Models for Daily Negative Affect Using Daily Perceived Stress, Religious Coping, and the Buffering Effect.

	Estimate	Std. Error	t-Ratio
Time ^R	-0.01	0.00	-5.11 ^{***}
Daily Stress ^R	0.34	0.03	11.27 ^{***}
Daily Religious Coping ^R	-0.02	0.01	-1.18
Daily Stress x Religious Coping ^R	-0.02	0.00	-2.76 ^{**}
Mean Daily Stress ^F	0.63	0.00	100.20 ^{***}
Mean Daily Religious Coping ^F	0.02	0.00	3.92 ^{***}

Note. All day-level predictors were person-mean centered and all person-level predictors were centered on sample means

* p < .05.

** p < .01

*** p > .001

R signifies parameters that were specified as random; F parameters were fixed.

Correlations between the dynamic characteristics representing the influence of Religious Coping on negative affect and indicators of metabolic health, controlling for age, gender, income, and education.

Table 4.

Dynamic Characteristic	Metabolic Indicators		
	A1c	BMI	W:H Ratio
Stress→NA	0.14 (0.14)	0.04 (0.67)	-0.06 (0.52)
Religious Coping→NA	0.19 (0.04)	0.02 (0.82)	0.18 (0.05)
Interaction→NA	-0.32 (0.00)	-0.06 (0.51)	-0.11 (0.24)
Composite	0.07 (0.48)		0.17 (0.06)
			-0.23 (0.01)

Note: Ns range from 125–128; *p-value* is in parentheses; significant relationships ($p < .05$) are **bold**; trend correlations ($p < .07$) are in *italics*.

A1c=Hemoglobin A1c; BMI=body mass index, W:H Ratio = waist to hip ratio