DAILY SPIRITUAL EXPERIENCES: A BUFFER AGAINST THE EFFECT OF DAILY PERCEIVED STRESS ON DAILY MOOD

A Thesis

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Abstract

by

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On the global level, spiritual experiences have been shown to buffer against the
negative effects of stress on well-being, but this global analysis does not necessarily
capture the daily processes at work. The present project examines the daily associations
between Perceived Stress (PSS), Daily Spiritual Experiences (DSE), and Mood (Positive
and Negative Affect; PA/NA), as well as how these associations are impacted by global
levels of Religious Practices, Religious Belief, and Daily Spiritual Experiences.
Participants were 244 older adults (aged 55-92) who filled out yearly questionnaires and
daily assessments. Multilevel modeling tested both within-person daily effects (Level 1)
and between-person global effects (Level 2). Results partially support the hypothesis that
DSE moderates the negative effects of PSS on same-day affect: there was a significant
buffering effect for NA but only a direct effect for PA. Global religiousness and
spirituality did not affect the daily parameters.
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CHAPTER 1

INTRODUCTION

Feelings of stress are an unfortunate reality of life, and can be the result of once-in-a-lifetime events such as the death of a spouse, as well as the everyday hassles of life such as car repairs or an argument with a loved one. Needless to say, this stress has a negative impact on well-being, both globally and on the daily level (Cohen & Williamson, 1988; Stawski, Sliwinski, Almeida, & Smyth, 2008). Individuals utilize a variety of resources in an effort to cope with stress and thereby ameliorate its negative effects; religious/spiritual (R/S) belief is one such resource, as it has been shown to both enhance positive well-being outcomes and buffer against the effects of stress on negative indicators of well-being (Ellison, 1991; Koenig, 1994; Pargament & Brant, 1998); the R/S indicator of interest in the present study is daily spiritual experience (DSE). Although DSE has been shown to buffer against the negative effects of stress on well-being at the global level, the presence and impact of stress and spiritual experience on mood varies from day to day for any given person (Keefe et al., 2001), and it is therefore necessary to investigate these relationships on a daily basis. To this end, the current study examines three primary questions. First and foremost is the investigation of whether DSE buffers against the negative impact of daily perceived stress on daily mood. Second, because life is a continuous experience and stress and mood cannot be encapsulated within a single
day, lagged effects will be explored, to ascertain whether the daily effects carry over beyond the current day. Third and finally, because the daily effects of DSE are likely to be a factor of how religious or spiritual people are in general, the impact of between-person differences in global R/S on these daily effects will also be investigated.

1.1 Stress and Coping

The theory most often used in the study of stress is the stress and coping framework, the most basic model of which is depicted in Figure 1; although there are many more complex versions of the model (e.g. Aldwin, 2009, p.247), they all stem from this same basic theoretical process, which was most comprehensively presented by Lazarus and Folkman (1984). According to this model, the stress-and-coping process begins when one is exposed to a stressful event or experience (a stressor); this exposure then prompts a cognitive appraisal of the situation, in which one assesses how “stressful” it is to him/her. What comes next largely depends on the nature of that appraisal—if the stressor is perceived to be relatively benign, then the process stops, and the individual goes on with his or her life; but if the stressor is appraised to be threatening in any way, then the coping process is triggered. The coping process consists of the individual’s utilization of available coping resources, such as social support or religious belief, in an attempt to maintain functioning and well-being in the face of the stress; the efficacy of a coping resource is demonstrated when it is shown to buffer or eliminate the anticipated negative impact of stress on well-being outcomes (Aldwin, 2009; Lazarus & Folkman, 1984).
1.2 Perceived Stress and Well-Being

Stress researchers use measures of both stress exposure, which generally index the number and/or content of stressors that individuals experience (Cohen, Tyrrell, & Smith, 1993; Rosengren et al., 2004); and stress appraisal, (also known as perceived stress), which tap the extent to which individuals “feel” stressed (Cohen, Kamarck, & Mermelstein, 1983; Murray, Daniels, & Murray, 2006). As would be expected, measures of stress exposure and stress appraisal tend to be moderately correlated (Kuiper, Olinger, & Lyons, 1986), and both have consistent associations with negative outcomes (Affleck, Tennen, Urrows, & Higgins, 1994; Cohen, Janicki-Deverts, & Miller, 2007). Perceived stress, however, has been shown to be somewhat more predictive of both physical and mental health outcomes than stress exposure alone (Cohen et al., 1993; Kuiper et al., 1986; Martin, Kazarian, & Breiter, 1995; Strodl, Kenardy, & Aroney, 2003). The fact that an individual’s reaction to a stressor has a more direct tie to well-being outcomes than the stressor itself corroborates the stress-and-coping model, which depicts the influence of stressors on outcomes as operating via perceived stress and the subsequent coping response (see Figure 1). Indeed, there is empirical evidence to support this idea: in a study looking at the effects of stress in women with fibromyalgia, Smith and colleagues (2010) found perceived stress to be a partial mediator of the impact of traumatic events on mental and physical health. In addition, a prospective study found perceived stress to
mediate the relationship between initial life events and quality-of-life at follow-up (Beatty, Lee, & Wade, 2009). Because of its strong theoretical and empirical ties to coping and well-being outcomes, the effects and associations of perceived stress are the primary focus of the present study.

As alluded to previously, perceived stress (PSS) is associated with a myriad of negative outcomes, including depression (Hewitt, Flett, & Mosher, 1992) and a variety of physical and mental health indicators (Smith et al., 2010). Additionally, prospective studies have found PSS to predict lower levels of general health (Lagana, & Reger, 2009), higher rates of depression, cardiovascular disease, and AIDS (Cohen et al., 2007), higher rates of respiratory symptoms and development of the common cold (Cohen, 2005; Cohen et al., 1993), lower levels of positive affect (Schiffrin, & Nelson, 2010), and higher levels of negative affect (Vacek, Coyle, & Vera, 2010). According to stress-and-coping theory, however, the strength and/or presence of these negative effects for any given individual is a factor of the utilization and efficacy of the coping resources at his/her disposal (Lazarus & Folkman, 1984).

There are two primary analytical approaches used when it comes to investigating the efficacy of a given coping resource on ameliorating the negative effects of stress, each of which implies its own theoretical assumptions: moderation implies a buffering effect in which the coping mechanism interacts with stress (e.g., the strength of stress’s effect on well-being depends on the presence of the coping mechanism), whereas mediation is more process-oriented (stress→coping resource→well-being), assuming (theoretically) that stress prompts the engagement of the coping mechanism, which in turn impacts well-being and serves to reduce or eliminate the direct effect of stress on
well-being (see Baron & Kenny, 1986 for a more complete discussion). Many coping resources, including those in the religious/spiritual coping realm, have been shown to function as both mediators and moderators of the relationship between stress and well-being (McCauley, Tarpley, Haaz, & Bartlett, 2008; Sun, Kosberg, Leeper, Kaufman, & Burgio, 2010); the analytic technique used therefore depends on the question of interest, as each answers a slightly different question about the role of the coping resource.

Although a variety of coping mechanisms have been identified as effective in mediating and/or moderating the negative impact of stress on well-being, including social support (Gadalla, 2010; Iso-Ahola & Park, 1996), perceived control (Norton et al., 2005), and humor (Able, 1998), the present project focuses on the coping role of religiousness and spirituality—specifically, whether everyday spiritual experiences buffer against the negative effects of perceived stress on mood. Because the primary question of interest concerns buffering effects, tests of moderation are more informative than tests of mediation; moderation will therefore be the analytical approach applied here.

1.3 Religiousness and Spirituality

In 2001, 80.4% of American adults reported an affiliation with some form of religious/spiritual group (U.S. Census Bureau, 2006). In addition, older adults (over age 65) are considerably more likely to consider faith to be “very important” in their lives than are younger adults (Pew Research Center, 2009). The substantial cultural presence of religion and spirituality, along with its particular significance to older adults, makes faith a potentially powerful coping mechanism in the lives of aging Americans. Indicators of religiousness and spirituality have robust associations with positive well-being indicators such as health and happiness (Ellison & Fan, 2008; Patrick & Kinney, 2003;
Levin & Chatters, 1998, Myers & Diener, 1995), and indicators of religious/spiritual coping are frequently endorsed by older adults facing chronic health problems (McCauley et al., 2008) and more severe life challenges (Ellison & Taylor, 1996). These religious and spiritual coping resources have been shown to be quite effective in buffering the association between stress and well-being, permitting individuals who are more religious and/or spiritual to maintain relatively higher levels of well-being in the face of stress than their less religious peers (Koenig, 1994; Lee, 2007; Pargament, 1997; Stuckey, 2001; Tix & Frazier, 1998).

Briefly, the constructs of religiousness and spirituality are difficult to investigate, primarily because there are so many ways in which they are defined and measured. A report by the Fetzer Institute, in collaboration with the National Institute on Aging (1999), sought to address this issue by identifying a number of distinct religious/spiritual dimensions (e.g., religious practices, religious coping, and daily spiritual experiences) as well as explicitly defining religiosity (which has a clear tie with organized religious tradition) and spirituality (which is more subjective and concerns a sense of transcendence) as discrete constructs.

Although religiousness and spirituality are distinct, they do tend to go hand-in-hand—religious traditions are likely to encourage and support spiritual growth, and a yearning for spiritual meaning often leads individuals to organized religion. In order to assess spirituality apart from organized religion, however, it is necessary to use measures of spiritual experience that are not explicitly tied to any specific religious tradition, and therefore more reflective of its personal and universal nature. To this end, Underwood and Teresi (2002) developed the Daily Spiritual Experiences Scale (DSES), which is
intended to assess the individual’s experience of the transcendent (the divine) in daily life. The short, 6-item form of this scale (Fetzer Institute/National Institutes on Aging, 1999) indexes the frequency with which one generally experiences the following: feels God’s presence; finds strength and comfort in religion; feels deep inner peace and harmony; desires to be closer to God; feels God’s love for them; and feels spiritually touched by the beauty of creation. It is important to note that the term “daily” in the title of the scale is meant to indicate that these are experiences that can occur on an everyday (non-pathological) basis; it does not indicate that it is meant to be administered on a daily basis, as it is in fact a global scale, asking about frequencies of these experiences “in general.”

Research indicates that more frequent daily spiritual experience (DSE), measured globally, is positively related to favorable outcomes. For example, a study looking at the impact of religiousness and spirituality on health behaviors in young adult cancer survivors found that young adults reporting more frequent spiritual experiences adhered significantly better to their prescribed health regimen, whereas those experiencing religious struggle had more difficulty (Park, Edmondson, Hale-Smith, & Blank, 2009). Additionally, Ellison and Fan (2008) examined the associations between DSE and a number of psychological well-being indicators in a large, nationally-representative sample, and found DSE to be strongly predictive of positive outcomes (happiness, self-esteem, optimism, and excitement with life) but not related to negative outcomes (indicators of psychological distress); these results held across demographic differences and levels of stress.

1 In some administrations, each reference to “God” is either conditioned or replaced with “a higher power” in order to make the scale more universally applicable.
There is also some indication that indices of DSE may capture a form of religious/spiritual coping: McCauley and colleagues (2008) found that in patients with arthritis, those with a greater number of comorbid conditions reported more frequent DSE, and in turn, higher global DSE scores were associated with elevated levels of energy and fewer depressive symptoms. Additionally, a number of studies examining and comparing indicators of both religious coping and daily spiritual experiences have found them to have similar patterns of effects (Jackson & Bergeman, 2010; Keefe et al., 2001). For this reason, the present study focuses on how daily spiritual experiences—as a reflection of religious coping—may buffer against the negative effects of daily perceived stress on daily mood.

1.4 Daily Stress, Mood, and Spirituality

When it comes to the impact of daily perceived stress on daily indicators of well-being, one’s level of stress appraisal on a given day is consistently associated with that day’s mood—higher perceptions of stress predict both higher negative affect and lower positive affect, across demographic and situational factors (Charles, Luong, Almeida, Ryff, Sturm, & Love, 2010; Johnson, Husky, Grondin, Mazure, Doron, & Swendsen, 2008; Stawski et al., 2008). Thus far, the coping framework has been discussed in the context of global effects; but coping theory can easily be applied within a daily paradigm, in which an individual, facing relatively high levels of perceived stress on a given day, utilizes coping resources—such as calling a friend, going for a walk, or praying to a higher power—in order to deal with the negative effects of the stress and maintain a more positive outlook or mood on that day than they would be able to otherwise. Indeed, many studies in a variety of research domains have examined coping processes on the daily
level and found evidence that daily coping mechanisms can both mediate and moderate
the link between daily stress and daily well-being indicators (Hema, Roper, Nehring,
Call, Mandleco, & Dyches, 2009; Mallett & Swim, 2005; Pottie & Ingram, 2008).

Little is as yet understood when it comes to the role of religiousness and
spirituality on a daily level, as it is still uncommon to find religious and spiritual
constructs measured on a daily basis. One reason for this may be the perception that
religiosity and spirituality are highly stable, primarily trait-based constructs that vary only
marginally, if at all, from one day to the next. The studies that have examined R/S indices
on a daily basis, however, provide evidence for substantial within-person variability in
these factors: one study assessing religious and spiritual constructs on a daily basis in the
context of coping with chronic pain found that variance due to within-person factors
ranged from 20.3% (for Daily Spiritual Experiences) to 32.1% (for Salience of Religion
for Coping); these percentages are comparable to those found for other constructs that
have been measured on a daily basis (e.g. pain; Keefe et al., 2001). That there is within-
person variability remaining for indices of religious coping and spiritual experience after
between-person effects are accounted for is evidence that they have potential as daily
coping resources—they change from day-to-day, and this fluctuation may reflect their
role as buffers against the negative effects of a given day’s perceived stress on that day’s
mood.

One study (Keefe et al., 2001) specifically examined the coping efficacy of daily
spiritual experience on the negative impact of chronic pain on daily mood. Results
showed that chronic pain sufferers reporting a greater degree of daily spiritual
experiences maintained higher levels of positive affect and lower levels of negative affect
than those with similar levels of pain but who reported lower levels of daily spiritual experiences, indicating the presence of a buffering effect for DSE. Additionally, a study looking at various daily coping resources as mediators of the relationship between attributions of stressful circumstances and daily affect found daily religious coping to be a partial mediator of the daily stress–affect association (Roesch, Vaughn, Aldridge, & Villodas, 2009). Assuming that levels of daily spiritual experiences index the presence of religious and spiritual coping in response to a given day’s perceived stress, as well as that the efficacy of such coping is reflected in the levels of positive and negative affect reported on that day, it follows that having higher levels of daily spiritual experiences will serve as a buffer against the deleterious effects of a given day’s perceived stress on that day’s mood.

1.5 Present Study

The primary goal of the current project is to apply stress-and-coping theory within a daily paradigm in order to investigate whether daily spiritual experiences buffer against the negative effects of a given day’s level of perceived stress on that day’s mood (positive and negative affect). Because the negative effects of perceived stress and the buffering effects of daily spiritual experiences are not necessarily restricted to a single day, potentially impacting mood beyond the day on which they are actually reported, these daily effects will also be investigated as predictors of mood one- and two-days out. Studies looking at the lagged influence of stress on mood have found some evidence for carryover effects, with mood being impacted up to two days after the day on which the stress was initially reported (Affleck et al., 1994; Ong, Bergeman, Bisconti, & Wallace,
there are no existing studies that have tested time-lag effects of daily spiritual experiences.

The extent to which one experiences transcendence and/or the presence of the divine in daily life is necessarily a factor of how religious and/or spiritual he or she is in general. I will therefore also consider the effect of global measures of religious belief, religious practices, and spiritual experiences on the within-day daily effects. The few studies that have examined religious and spiritual indices on the daily level have not included global indices of religiousness or spirituality in their between-persons analysis (Keefe et al., 2001; Foster, 2009), and it is therefore difficult to make an informed hypothesis. There is evidence, however, that global religious indicators such as denominational affiliation do moderate the within-person effects of religious coping (Tix & Frazier, 1998); so it is possible that those who are higher on a given religious/spiritual dimension (religious belief, religious practices, daily spiritual experience) in general experience more pronounced buffering benefits than those for whom religiousness and spirituality are generally less important. Any global by daily moderating effects that are found will contribute to the current understanding of how global religiousness and spirituality impact the daily stress-and-coping process.

So, there is one primary and two secondary sets of analyses. The primary set of analyses concerns the investigation of the within-day effects (main effects and interaction), with the buffering effect of DSE on the PSS–mood association being of principal interest. The first set of secondary analyses concerns the lagged results, and includes any main effects, moderating effects, and mediating effects that may be found. And the second set of secondary analyses concerns the exploration of between-person
effects, to see if global R/S indicators moderate any of the within-day associations.

Specific hypotheses are as follows:

1. Within-day main effects and associations: PSS will predict higher NA and lower PA; DSE will predict lower NA and higher PA.

2. Within-day interaction (moderating) effects: the interaction effect between PSS and DSE will predict lower NA and higher PA, so that DSE buffers against PSS on daily mood.

3. Lagged main effects: PSS will continue to predict higher NA and lower PA one day out; DSE will continue to predict lower NA and higher PA one day out. Should any of these effects be significant in the 1-day-lag model, they will also be tested in the 2-day-lag model.

4. Lagged interaction (moderating) effects: because the PSS x DSE interaction effect is likely to be smaller than the main effects, it is not expected to be significant in the 1-day-lag analysis; if it is, however, it will also be tested in the 2-day-lag model.

5. Global R/S effects: those higher on the global R/S indicators will experience stronger daily effects of DSE than those lower on the global R/S indicators.

Multilevel modeling will be used to test these hypotheses, as they concern both within-person daily associations (Level 1) and the impact of between-persons global factors on the Level 1 parameters (Level 2). Additional information regarding the analysis is presented in the proposed analyses section.
CHAPTER 2

METHOD

2.1 Participants and Procedure

Participants come from the larger Notre Dame Study of Health and Well-Being (NDHWB), a project exploring the processes and correlates of stress and well-being in middle-aged and older adults (Bergeman et al., 2010). The NDHWB study is a cross-sequential, 5-year longitudinal project in which participants fill out extensive self-report survey assessments each year for 5 years; those willing do so also complete daily diary assessments for 56 days in Years 1, 3, and 5. A subsample of participants also takes part in individual, in-depth interviews in Years 2 and 4. NDHWB participants (N = 783; 338 in the older cohort and 445 in the midlife cohort) were recruited from lists of middle-aged and older adults in the northern Indiana area, which were provided by a market research firm and compiled based on multiple information sources including census data and the Survey of Residential Households. Participants received a questionnaire packet in the mail that they completed and returned at their convenience in a postage-paid return envelope supplied by the researchers. Participants received gift cards to an establishment of their choice for their participation in each portion of the project ($20.00 a year for the yearly questionnaire, $10.00 per week for the daily diary, and $30.00 for the interview).

The subsample used in the present study consists of 274 older adults aged 55 to 80 years (mean age = 69.45) who participated in both the yearly questionnaire and daily
diary portions of the NDHWB study at Year 3, as this was this wave of the daily data collection that included an assessment of daily spiritual experience. Because the two cohorts (later life and midlife) are lagged in time, Year 3 data from the midlife cohort is still being collected and is not available for this project. Demographic characteristics for the subsample are as follows: 63% of participants are female; 45% of participants are married, 23% are widowed, 23% are divorced or separated, and 9% are single; 97% have at least a high school education, and 29% have a college degree; the sample is 83% Caucasian, 11% African American, 3% Hispanic or Latino, 1% Asian or Pacific Islander, and 2% Other. When it comes to income, 2% make less than $7,500 annually, 17% earn between $7,500 and $14,999, 22% earn between $15,000 and $24,999, 25% earn between $25,000 and $39,999, 25% earn between $40,000 and $74,999, 6% earn between $75,000 and $99,999, and 3% earn $100,000 or more.

Because 30 (11%) of the 274 individuals for whom we have daily data did not fill out the daily DSE scale on any of the 56 days and are therefore omitted in the final models for which daily DSE effects are of primary interest, t-tests and ANOVAs were used to test for differences in the demographic and religious variables between the 244 participants who completed the 5-item DSE scale at least once over the 56 days of the study and the 30 people who participated in the daily diaries but elected not to fill out the DSE scale for any of the 56 days. Results of these tests (using adjustments for the unbalanced group sizes) indicated that the group that did not fill out the daily DSE scale (N=30) was more likely to be male (44.8% versus 36.1% in the other group); more likely to be Caucasian (93% versus 82%); and tended to have a slightly lower income. Concerning education, the group without daily DSE data had a slightly lower mean on
education (8 response options ranging from grade school to graduate/medical/law degree); however, the group with daily DSE data had a broader range of education, because people in the lowest (grade and middle school) and highest (graduate, medical, or law degree) categories were not represented in the 30-person group. The two groups did not differ on age or marital status. As would be expected, the group with daily DSE data (N=244) had higher mean scores on all three global religiosity/spirituality scales, with the difference having a significance of p<.0001 for all three. Overall, the sample of participants who filled out the daily DSE scale is still largely representative of the overall sample, although they do tend to be more religious and/or spiritual.

2.2 Measures

2.2.1 Daily Perceived Stress

The Perceived Stress Scale (PSS; Cohen et al., 1983), which is intended to index “the degree to which respondents [find] their lives unpredictable, uncontrollable, or overwhelming” (p. 387) on a global level, was adapted for use in the daily questionnaire. Specifically, 10 of the original 14 items (see Appendix for specific items included) were altered to better reflect the daily context; example items include “Today I was upset because of something that happened unexpectedly” and “Today I felt confident about my ability to handle my personal problems.” Items were rated on a 4-point scale (strongly disagree to strongly agree); 4 of the items were reversed scored, so that higher scores reflect higher perceived stress ($\alpha_{day10} = .89$).
2.2.2 Daily Spiritual Experiences

The version of the Daily Spiritual Experiences Scale (DSES; Underwood & Teresi, 2002) included in the daily assessment of the present study consisted of 5 items from the short 6-item version selected for the Brief Multidimensional Measure of Religiosity and Spirituality (BMMRS; Fetzer Institute/National Institute on Aging, 1999), with a few modifications: first, the items were converted into the past tense to allow participants to think back over their day when responding; second, “spiritual beliefs” replaced what was “religion” in the original scale (“I found strength and comfort in my spiritual beliefs”); and third, the response format was changed from 6 points to 4 points (not at all, a little bit, somewhat, and very much) to make it more consistent with the other measures included in the daily diary assessment. Example items included in the daily version of the scale used in the present study include “I felt God’s presence” and “I felt a deep inner peace or harmony” (see Appendix for complete scale); higher scores indicate greater daily spiritual experiences, with a possible scoring range from 5 to 20. Instructions asked participants to indicate the extent to which they experienced each item “TODAY,” but also told them that if they did not wish to answer these religious/spiritual questions, they could skip to the next section. Reliability for the daily version of this measure ($\alpha_{day10}$) was .93 in the current sample.

2.2.3 Daily Mood

Daily mood was indexed by positive and negative affect, measured using the Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988). The scale consists of a list of 10 negative affect descriptors and 10 positive affect descriptors, and the individual rates the extent to which he or she feels each emotion that day on a 5-
point scale, ranging from not at all to extremely. Positive Affect items include words such as active, enthusiastic, inspired, and strong, and Negative Affect items include words such as afraid, ashamed, hostile, and distressed (see Appendix for complete list of items); higher PA and NA scores indicate greater positive affect and negative affect, respectively. In the full NDHWB sample, the PA scale demonstrated reliability on the daily level, with $\alpha_{\text{day}10} = .94$; for NA, $\alpha_{\text{day}10} = .90$.

2.2.4 Global Religiosity/Spirituality Measures

All three of the global religious/spiritual scales used in the yearly NDHWB questionnaires were drawn from the BMMRS items (Fetzer Institute/National Institute on Aging, 1999), but rather than adhere to the original scale structure, the 32 items selected for use in the NDHWB study were split into 3 scales based on the results of a factor analysis: Religious Practices, Religious Belief, and Spiritual Experiences. All three scales are presented in their entirety in the Appendix. The Religious Practices scale consists of 7 items, 5 indexing private religious practices (frequency of prayer, religious reading) and 2 measuring organizational religiousness (frequency of attendance at religious services and activities). The items are rated on an 8-point frequency scale, with response options ranging from never to more than once a day. A higher score indicates greater participation in religious practices; $\alpha = .88$. The Religious Belief scale includes items from the Religious and Spiritual Coping, Values/Beliefs, Forgiveness, Religious Support, and Commitment subscales of the BMMRS, for a total of 16 items such as “I have forgiven myself for things that I have done wrong” and “I wonder whether God has abandoned me.” Items were prompted with “Because of my spiritual/religious beliefs…” and were rated on a 4-point scale ranging from always to never. Higher scores indicated
greater religious belief; $\alpha = .89$. The Spiritual Experiences scale was simply the 6-item Daily Spiritual Experiences scale from the BMMRS, rated on a 6-point scale ranging from *never or almost never* to *many times a day*, with higher scores indicating greater spiritual experience; $\alpha = .93$. Example items include “I desire to be closer to or in union with God” and “I feel deep inner peace or harmony.”
CHAPTER 3

ANALYTIC DESIGN AND RATIONALE

3.1 Time Metrics and Change Models

In order to capture the daily processes of interest, the present study includes 56 daily assessments, each spaced one day apart (participants were instructed to complete the daily diaries at night before bed). The time variable Day is recalibrated (Day-1), so that the Day 1 assessment becomes the Day 0 assessment, etc.; this is so that the intercept parameters are more interpretable (e.g., the intercept will reflect scores on the initial day). This study is fundamentally different from many other studies using longitudinal data, as it does not concern growth or decline across time. In fact, unless the preliminary analyses reveal significant trends across day for the daily variables of interest, the Time variable (“Day-1”) may not even be included in the models. The design of this study is intended to capture relationships among variables on a given day, as well as how the impact of these variables carry over into next two days; this very micro approach makes the “Time” variable less relevant than it would be were the interest in, for example, performance improvement across days of practice or decreases in symptoms across days of treatment.

3.2 Analyses

The following section contains the specific questions to be addressed and the corresponding equations (Level 1 and Level 2 models) that were used to test these
hypotheses. Capital letters (e.g., A) indicate Level 1 models, whereas lower-case letters (e.g., a) indicate Level 2 models. There are a few notes that should be made regarding the analysis. First, although the model equations use the term “Mood” to represent the outcome variable, positive affect and negative affect were actually tested separately, so that each model in effect represents two analyses—one for PA and one for NA. Second, although presented separately for clarity, the Level 2 models were tested simultaneously with the corresponding Level 1 equations. Third, in order to account for between-person differences in the mean level of mood across days, terms reflecting the effect of mean DSE and mean PSS (calculated across days for each person) are included in Level 2 for the Level 1 intercept parameter ($\beta_{0j}$). Fourth, in order to aid in the interpretability of the results as well as to make it easier to disentangle within- and between- person sources of variance, all of the Level 1 time-varying covariates are centered at the person means so that a score of zero indicates the mean level of the given variable across days for that person; and the global independent variables (religious practices, religious belief, and spiritual experience) are centered at the sample means so that a score of zero indicates the person is at the mean of the sample. Fifth, for all of our analyses the missing data—an inevitable artifact of longitudinal research—is assumed to be missing at random (MAR); likelihood-based (full-likelihood estimation) methods are therefore used in order to achieve accurate estimates. And finally, in the Level 1 models, random parameters (those effects allowed to vary from person to person) are indicated by a $j$ subscript (e.g., $\beta_{0j}$); those Level 1 parameters without a $j$ subscript are fixed, so that the effect is assumed to be uniform across individuals. All models are presented in Table 1.
### TABLE 1

**UNCONDITIONAL, LAGGED, AND CONDITIONAL MULTILEVEL MODELS**

<table>
<thead>
<tr>
<th>Model</th>
<th>Level 1 Equations (Within-Person Effects)</th>
<th>Level 2 Equations (Between-Person Effects)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Unconditional Means Model</td>
<td>$y_{ij}(\text{Mood}) = \beta_0 + \epsilon_{ij}$</td>
<td>$\beta_0 = \gamma_{00} + u_{ij}$</td>
</tr>
<tr>
<td>B. Unconditional Slope Model</td>
<td>$y_{ij}(\text{Mood}) = \beta_0 + \beta_1(\text{Day}) + \epsilon_{ij}$</td>
<td>$\beta_0 = \gamma_{00} + u_{ij}$ $\beta_1 = \gamma_{10}$</td>
</tr>
<tr>
<td>C. PSS Effects</td>
<td>$y_{ij}(\text{Mood}) = \beta_0 + \beta_2(\text{PSS}) + \epsilon_{ij}$</td>
<td>$\beta_0 = \gamma_{00} + \gamma_{01}\text{MeanPSS} + u_{ij}$ $\beta_2 = \gamma_{20} + u_{ij}$</td>
</tr>
<tr>
<td>D. DSE Effects</td>
<td>$y_{ij}(\text{Mood}) = \beta_0 + \beta_3(\text{DSE}) + \epsilon_{ij}$</td>
<td>$\beta_0 = \gamma_{00} + \gamma_{02}\text{MeanDSE} + u_{ij}$ $\beta_3 = \gamma_{30} + u_{ij}$</td>
</tr>
<tr>
<td>E. DSE and PSS Effects</td>
<td>$y_{ij}(\text{Mood}) = \beta_0 + \beta_2(\text{PSS}) + \beta_3(\text{DSE}) + \epsilon_{ij}$</td>
<td>$\beta_0 = \gamma_{00} + \gamma_{01}\text{MeanPSS} + \gamma_{02}\text{MeanDSE} + u_{ij}$ $\beta_2 = \gamma_{20} + u_{ij}$ $\beta_3 = \gamma_{30} + u_{ij}$</td>
</tr>
<tr>
<td>F. PSS x DSE Interaction Effects</td>
<td>$y_{ij}(\text{Mood}) = \beta_0 + \beta_2(\text{PSS}) + \beta_3(\text{DSE}) + \beta_4(\text{PSSxDSE}) + \epsilon_{ij}$</td>
<td>$\beta_0 = \gamma_{00} + \gamma_{01}\text{MeanPSS} + \gamma_{02}\text{MeanDSE} + u_{ij}$ $\beta_2 = \gamma_{20} + u_{ij}$ $\beta_3 = \gamma_{30} + u_{ij}$ $\beta_4 = \gamma_{40} + u_{ij}$</td>
</tr>
<tr>
<td>G. 1-day Lagged Model</td>
<td>$y_{ij}(\text{Mood}_{i+1}) = \beta_0 + \beta_1(\text{Mood}_i) + \beta_2(\text{PSS}_i) + \beta_3(\text{DSE}_i) + \beta_4(\text{PSSxDSE}<em>i) + \epsilon</em>{i+1}$</td>
<td>$\beta_0 = \gamma_{00} + \gamma_{01}\text{MeanPSS}<em>i + \gamma</em>{02}\text{MeanDSE}<em>i + u</em>{ij}$ $\beta_1 = \gamma_{10}$ $\beta_2 = \gamma_{20} + u_{ij}$ $\beta_3 = \gamma_{30} + u_{ij}$ $\beta_4 = \gamma_{40} + u_{ij}$</td>
</tr>
<tr>
<td>H. 2-day Lagged Model</td>
<td>$y_{ij}(\text{Mood}_{i+2}) = \beta_0 + \beta_1(\text{Mood}<em>i) + \beta_2(\text{Mood}</em>{i+1}) + \beta_3(\text{PSS}_i) + \beta_4(\text{DSE}_i) + \beta_5(\text{PSSxDSE}<em>i) + \epsilon</em>{i+1}$</td>
<td>$\beta_0 = \gamma_{00} + \gamma_{01}\text{MeanPSS}<em>i + \gamma</em>{02}\text{MeanDSE}<em>i + u</em>{ij}$ $\beta_1 = \gamma_{10}$ $\beta_2 = \gamma_{20}$ $\beta_3 = \gamma_{30} + u_{ij}$ $\beta_4 = \gamma_{40} + u_{ij}$ $\beta_5 = \gamma_{50} + u_{ij}$</td>
</tr>
<tr>
<td>K. Between-Person Conditional Model: Global R/S Effects</td>
<td>$y_{ij}(\text{Mood}) = \beta_0 + \beta_2(\text{PSS}) + \beta_3(\text{DSE}) + \beta_4(\text{PSSxDSE}) + \epsilon_{ij}$</td>
<td>$\beta_0 = \gamma_{00} + \gamma_{01}\text{MeanPSS} + \gamma_{02}\text{MeanDSE} + \gamma_{03}(\text{RelBlef}) + \gamma_{04}(\text{RelPrac}) + \gamma_{05}(\text{SpirExp}) + u_{ij}$ $\beta_2 = \gamma_{20} + \gamma_{21}(\text{RelBlef}) + \gamma_{22}(\text{RelPrac}) + \gamma_{23}(\text{SpirExp}) + u_{ij}$ $\beta_3 = \gamma_{30} + \gamma_{31}(\text{RelBlef}) + \gamma_{32}(\text{RelPrac}) + \gamma_{33}(\text{SpirExp}) + u_{ij}$ $\beta_4 = \gamma_{40} + \gamma_{41}(\text{RelBlef}) + \gamma_{42}(\text{RelPrac}) + \gamma_{43}(\text{SpirExp}) + u_{ij}$</td>
</tr>
</tbody>
</table>
3.3 Analytic Plan: Within-Day Unconditional Models

3.3.1 Unconditional Means Model

In order to establish a baseline for comparison, the first model to be tested will be the unconditional means model (A), which includes no predictors and partitions the variability of mood (positive and negative affect) into between-person and within-person portions.

\[ y_{ij} = \beta_{0j} + e_{ij} \]  

In Model A, \( y_{ij} \) is the observed positive or negative affect score on day \( i \) for person \( j \); \( \beta_{0j} \) is the mean positive or negative affect score across days for person \( j \); and \( e_{ij} \) is the residual for day \( i \) and person \( j \). The variance of the \( e_{ij} \) term represents the amount of the variability in mood that is attributable to intraindividual influences.

The Level 2 model (a) below will also be tested:

\[ \beta_{0j} = \gamma_{00} + u_{0j} \]  

Equation (a) tells us the extent to which the average positive or negative affect score across the 56 days for person \( j \) (\( \beta_{0j} \)) is explained by the overall (grand) mean of negative or positive affect across all days and participants (\( \gamma_{00} \)) and the unique contribution of person \( j \) (\( u_{0j} \)).

3.3.2 Unconditional Slope Model

The 56 days of the daily diary assessments are intended to represent a portion of participants’ normal everyday lives, and as such responses are not expected to vary systematically (e.g., increase or decrease in a linear fashion) over the course of the 56 days. Should a linear trend be found for the daily variables, however, a day-of-study
variable will be added to subsequent analyses in order to control for this effect. Note that because a systematic effect across days would not be expected to vary from person to person, the Day variable is fixed, so that its effect is treated as the same for everyone, rather than being free to vary across individuals. The Level 1 model testing this is presented below (B):

$$y_{ij} = \beta_{0j} + \beta_1(Day) + e_{ij} \quad (B)$$

In this equation, all terms have the same referents as in model (A); the only addition is the term representing the effect of day (1-56) on person j’s mood on day i, which is centered at Day-1 so that what was Day 1 is now Day 0, and so on. Note that the addition of this term means that the meaning of the $\beta_{0j}$ term changes somewhat; now, it represents the positive or negative affect score for person j when Day = 0, or on the first day of the diary study. The between-person Level 2 models (b1) and (b2) corresponding to equation (3a) are present below:

$$\beta_{0j} = \gamma_{00} + u_{0j} \quad (b1)$$

$$\beta_1 = \gamma_{10} \quad (b2)$$

Equation (b1) partitions the variance in $\beta_{0j}$ according to that explained by the average mood score across individuals on the first day of the study ($\gamma_{00}$) and the unique contribution of person j ($u_{0j}$). Because Day is treated as a fixed effect (rather than a random effect), there is no individual error term in equation (b2); rather, $\beta_1$ simply equals $\gamma_{10}$. A significant $\gamma_{10}$ term indicates the presence of a linear trend across days, and the Day effect may then need to be controlled for in subsequent analyses (note that in subsequent models, the Day term is excluded; it will be added to all models if the results of this model demonstrate that it is necessary).
3.3.3 Effects of PSS

The next model in the progression will add a term for the effect of perceived stress (PSS) at Level 1 (C):

\[ y_{ij} = \beta_{0j} + \beta_{2j}(PSS_{ij}) + e_{ij} \]  

(C)

Here, \( y_{ij} \) is once again the positive or negative affect score for person \( j \) on day \( i \); because the daily PSS score is centered on the person mean \( (PSS_{ij} - \text{meanPSS}_j) \) \( \beta_{0j} \) now represents the positive or negative affect score for person \( j \) when \( PSS_{ij} = 0 \), or on a day when person \( j \) experiences an average level of perceived stress for him or her. The \( \beta_{2j} \) term is the effect of PSS on mood for person \( j \), and is expected to be negative for PA (lower PSS predicts higher PA) and positive for NA (higher PSS predicts higher NA). The Level 2 models to be tested with (C) are below. Note that model (c1) controls for the effect of an individual’s mean level of perceived stress on the intercept parameter \( (\gamma_{00}) \):

\[ \beta_{0j} = \gamma_{00} + \gamma_{01}(mPSS_j) + u_{0j} \]  

(c1)

\[ \beta_{2j} = \gamma_{20} + u_{2j} \]  

(c2)

3.3.4 Effects of DSE

The next model in the progression will add a term for the effect of daily spiritual experiences (DSE) at Level 1 (D):

\[ y_{ij} = \beta_{0j} + \beta_{3j}(DSE_{ij}) + e_{ij} \]  

(D)

Here, person \( j \)’s mood on day \( i \) \( (y_{ij}) \) is explained by the intercept parameter \((\beta_{0j})\) and the effect of DSE for person \( j \) \((\beta_{3j})\); like PSS, the daily DSE score is centered on the person mean \( (DSE_{ij} - \text{meanDSE}_j) \), so \( \beta_{0j} \) reflects the positive or negative affect score for person \( j \) when \( DSE_{ij} = 0 \), or on a day when person \( j \) experiences an average number of daily
spiritual experiences for him or her. The $\beta_{3j}$ term is the effect of DSE on mood for person $j$, and is expected to be positive for PA (higher DSE predicts higher PA) and negative for NA (lower DSE predicts higher NA). The Level 2 models to be tested with (D) are below; note once again the term controlling for an individual’s mean level of DSE ($\gamma_{02}$):

$$\beta_{0j} = \gamma_{00} + \gamma_{02}(mDSE_{ij}) + u_{0j} \quad \text{(d1)}$$

$$\beta_{3j} = \gamma_{30} + u_{3j} \quad \text{(d2)}$$

3.3.5 Effects of PSS and DSE

The next model in the progression will include the effects of both PSS and DSE at Level 1, in order to see if they account for any shared variance of daily mood (E); when compared with the results of the previous two models (C and D), the results of this model will also reveal whether there is any mediation occurring between the two variables.

$$y_{ij} = \beta_{0j} + \beta_{2j}(PSS_{ij}) + \beta_{3j}(DSE_{ij}) + e_{ij} \quad \text{(E)}$$

Here, person $j$’s mood on day $i$ ($y_{ij}$) is explained by the intercept parameter ($\beta_{0j}$), the effect of PSS on mood for person $j$ ($\beta_{2j}$), and the effect of DSE on mood for person $j$ ($\beta_{3j}$); because both PSS and DSE scores are centered on the person means, $\beta_{0j}$ reflects the positive or negative affect score for person $j$ when both PSS and DSE$_{ij} = 0$, or on the “average” day. Note that this parameter is no longer very meaningful, as it is unlikely that an individual experiences exactly the average level of PSS and the average level of DSE on the same day. The Level 2 models to be tested with (E) are below, with both mean terms ($\gamma_{01}$ and $\gamma_{02}$) included in the model for the intercept parameter:

$$\beta_{0j} = \gamma_{00} + \gamma_{01}(mPSS_{j}) + \gamma_{02}(mDSE_{ij}) + u_{0j} \quad \text{(e1)}$$

$$\beta_{2j} = \gamma_{20} + u_{2j} \quad \text{(e2)}$$

$$\beta_{3j} = \gamma_{30} + u_{3j} \quad \text{(e3)}$$
3.3.6 Daily Moderator (Buffer) Model

The final unconditional model to be tested in this taxonomy adds a Level 1 parameter for the daily interaction effect of PSS x DSE, in an attempt to address the question of whether DSE serves as a buffer against the negative effect of PSS on daily mood (F). Note that, like the main effects, the interaction term is also centered on the person mean:

\[ y_{ij} = \beta_{0j} + \beta_{2j}(PSS_{ij}) + \beta_{3j}(DSE_{ij}) + \beta_{4j}(PSS \times DSE_{ij}) + e_{ij} \] (F)

In the above equation (F), the mood (positive or negative affect) of person \( j \) on day \( i \) is explained by that person’s mood on the “average day” (\( \beta_{0j} \)—when PSS, DSE, and their interaction all equal zero); the main effect of negative life events on mood for person \( j \) (\( \beta_{2j} \)) on days with an average level of DSE; the main effect of DSE on mood for person \( j \) (\( \beta_{3j} \)) on days with an average level of PSS; and the interaction effect between PSS and DSE on mood person \( j \) (\( \beta_{4j} \)) across days. A significant interaction term (\( \beta_{4j} \)) in the negative direction would indicate the presence of a moderating (buffering) effect. The corresponding Level 2 models reflecting the between-person influences on each of the coefficients in the Level 1 model are presented below:

\[ \beta_{0j} = \gamma_{00} + \gamma_{01}(mPSS_j) + \gamma_{02}(mDSE_j) + u_{0j} \] (f1)
\[ \beta_{2j} = \gamma_{20} + u_{2j} \] (f2)
\[ \beta_{3j} = \gamma_{30} + u_{3j} \] (f3)
\[ \beta_{4j} = \gamma_{40} + u_{4j} \] (f4)

Model (f1) explains the intercept (\( \beta_{0j} \)) with the average mood across persons when they are at their centered average (zero) on PSS, DSE, and their interaction (\( \gamma_{00} \)), controlling for the effects of the individual’s mean levels of PSS and DSE (\( \gamma_{01} \) and \( \gamma_{02} \)):
the \((u_{0j})\) term reflects the unique contribution of the individual. Equations (f2) through (f4) reflect the mean slope of the respective predictors on mood across persons \((\gamma_{20}, \gamma_{30}, \gamma_{40})\), and the individual effects of person \(j\) \((u_{2j}, u_{3j}, u_{4j})\) on each of the predictors in the Level 1 model \((\beta_{2j}, \beta_{3j}, \beta_{4j})\).

3.4 Analytic Plan: Time-Lagged Models

In order to test for lagged effects, the same set of unconditional models described for the within-day analyses will be repeated, for models lagged 1- and 2-days out. That is, rather than the dependent variable being today’s mood \((\text{Mood}_i)\), it will become either tomorrow’s mood \((\text{Mood}_{i+1})\) or the day-after-tomorrow’s mood \((\text{Mood}_{i+2})\). Additionally, the effect of the previous day(s)’ mood will be controlled for by adding fixed terms for \(\text{Mood}_i\) and/or \(\text{Mood}_{i+1}\) as predictors in the Level 1 model (note that like the other time-varying covariates, they will be centered at the person mean). Remember that once again, “Mood” represents PA or NA, which will be tested separately. The most complex Level 1 models for the 1-day-lag analysis (G) and the 2-day-lag analysis (H) are presented below; these models are also included in Table 2, along with their corresponding Level 2 models.

\[
y_{ij}(\text{Mood}_{i+1}) = \beta_{0j} + \beta_{1}(\text{Mood}_i) + \beta_{3j}(\text{PSS}_i) + \beta_{4j}(\text{DSE}_i) + \beta_{5j}(\text{PSSxDSE}_i) + e_{i+1} \quad (G)
\]

\[
y_{ij}(\text{Mood}_{i+2}) = \beta_{0j} + \beta_{1}(\text{Mood}_i) + \beta_{2}(\text{Mood}_{i+1}) + \beta_{3j}(\text{PSS}_i) + \beta_{4j}(\text{DSE}_i) + \beta_{5j}(\text{PSSxDSE}_i) + e_{i+2} \quad (H)
\]

In model (G), mood on day \(i+1\) \((\text{Mood}_{i+1})\) is explained by person \(j\)’s mood score on the average day \((\beta_{0j})\), the effect of day \(i\)’s mood \((\beta_1)\), the effect of day \(i\)’s perceived stress \((\beta_{3j})\), the effect of day \(i\)’s daily spiritual experiences \((\beta_{4j})\), the effect of day \(i\)’s interaction between PSS and DSE \((\beta_{5j})\), and the unique contribution of the individual on
day \( i + 2 \) \((e_{i+2})\). Model (H) is nearly identical to model (G), except that the dependent variable is mood on day \( i + 2 \) \((\text{Mood}_{i+2})\), and a term accounting for the effect of mood on day \( i + 1 \) \((\beta_2)\) is added.

3.5 Analytic Plan: Between-Person Effects

In order to address the between-person hypothesis that an individual’s global levels of religious belief, religious practices, and/or spiritual experiences impact the presence or strength of the Level 1 relationships, the between-person parameters for religious belief, religious practices, and spiritual experiences will be added to the Level 2 equations presented for equation (F) above, as shown in models (k1) through (k4) below. All three are included in the model simultaneously because they tend to be highly correlated with one another, and may tend to account for the same portion of the variance; by examining the effects of all three at once, it is possible to control for this, and any significant effects will be more valid than if the three religious/spiritual indices were analyzed separately. Note that the global religious/spiritual variables are centered on the overall sample mean, so that those scoring in the positive direction are above average, whereas those with negative scores are below average.

\[
\begin{align*}
\beta_{0j} &= \gamma_{00} + \gamma_{01}(mPSS_j) + \gamma_{02}(mDSE_j) + \gamma_{03}(RelBlef_j) + \\
&\quad \gamma_{04}(RelPrac_j) + \gamma_{05}(SpirExp_j) + u_{0j} \quad \text{(k1)}
\end{align*}
\]

\[
\begin{align*}
\beta_{2j} &= \gamma_{20} + \gamma_{23}(RelBlef_j) + \gamma_{24}(RelPrac_j) + \gamma_{25}(SpirExp_j) + u_{2j} \quad \text{(k2)}
\end{align*}
\]

\[
\begin{align*}
\beta_{3j} &= \gamma_{30} + \gamma_{33}(RelBlef_j) + \gamma_{34}(RelPrac_j) + \gamma_{35}(SpirExp_j) + u_{3j} \quad \text{(k3)}
\end{align*}
\]

\[
\begin{align*}
\beta_{4j} &= \gamma_{40} + \gamma_{43}(RelBlef_j) + \gamma_{44}(RelPrac_j) + \gamma_{45}(SpirExp_j) + u_{4j} \quad \text{(k4)}
\end{align*}
\]

Model (k1) explains the Level 1 intercept \((\beta_{0j})\) with the mean of mood across persons on the average day \((\gamma_{00})\); the effects of global religious belief \((\gamma_{03})\), global
religious practices ($\gamma_{04}$), and global spiritual experiences ($\gamma_{05}$); and the unique
collection of the individual ($u_{0j}$), controlling for the effects of the individual’s mean
levels of daily perceived stress ($\gamma_{01}$) and spiritual experiences ($\gamma_{02}$). Equations (k2)
through (k4) perform a similar function for each of the predictors in the Level 1 model
($\beta_{2i}, \beta_{3j}, \beta_{4j}$), with the parameters $\gamma_{20}, \gamma_{30},$ and $\gamma_{40}$ reflecting the average slope of each
Level 1 predictor on mood across person-days; the parameters $\gamma_{23}, \gamma_{33},$ and $\gamma_{43}$ reflecting
the effect of global religious belief; the parameters $\gamma_{24}, \gamma_{34},$ and $\gamma_{44}$ reflecting the effect of
global religious practices; the parameters $\gamma_{25}, \gamma_{35},$ and $\gamma_{45}$ reflecting the effect of global
spiritual experiences; and the residuals ($u_{2j}, u_{3j}, u_{4j}$) reflecting the individual contribution
of person $j$. Should any of the global religious/spiritual effects be significant, it would
indicate that global levels of religiousness and/or spirituality impact the intraindividual
effects observed at Level 1.
CHAPTER 4:

RESULTS

4.1 Descriptive Statistics

Please see Table 2 for means, standard deviations, and correlations of all predictor variables used. Note that the correlation figures are calculated based on a single day’s data (Day 10) due to the fact that including all observations (N x 56) would artificially inflate the significance of the correlations. The means and standard deviations, however, are reflective of all observations.

TABLE 2

MEANS, STANDARD DEVIATIONS, AND CORRELATIONS BETWEEN GLOBAL AND DAILY VARIABLES

<table>
<thead>
<tr>
<th></th>
<th>M</th>
<th>SD</th>
<th>1.</th>
<th>2.</th>
<th>3.</th>
<th>4.</th>
<th>5.</th>
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<tbody>
<tr>
<td>Daily Variables</td>
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<td>1. Positive Affect</td>
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<td>2. Negative Affect</td>
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<td>3. Perceived Stress</td>
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<td>.67</td>
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<td>4. Daily Spiritual Exp.</td>
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<td>Global Variables</td>
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<td>5. Religious Belief</td>
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<td>-.23</td>
<td>-.30</td>
<td>.61</td>
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NOTE: Means and standard deviations are calculated from all observations (for daily variables, “Obs.” = person days; for global variables, “obs.” = N). Correlations are calculated for Day = 10. Correlations in bold indicate p < .001; correlations in bold and italics indicate p<.05. N = 233.
4.2 Within-Day Unconditional Models

The results for the taxonomy of unconditional models outlined in Table 1 are shown in Tables 3 and 4, separately for negative affect (NA) and positive affect (PA). Note that the values for the gamma parameters ($\gamma_{00}, \gamma_{10}, \gamma_{20}, \gamma_{30}, \gamma_{40}$), which reflect the fixed effects of the Level 1 beta parameters ($\beta_{0j}, \beta_{1j}, \beta_{2j}, \beta_{3j}, \beta_{4j}$), are of greatest interest here, because they most directly inform the primary hypotheses. A few broad observations on the results: first, the day effect was not significant for either negative or positive affect, and was therefore not included in subsequent models in order to make them more parsimonious; second, both perceived stress (PSS) and daily spiritual experiences (DSE) were significantly associated with both NA and PA in the hypothesized directions, so that higher PSS predicted poorer mood (lower PA and higher NA), and higher DSE predicted better mood (higher PA and lower NA) on the same day; and finally, the fixed effect for the interaction term (DSE x PSS) was significant for NA but not for PA, indicating that the hypothesized moderating (buffering) effect is present only for NA. The results of each individual model are presented in greater detail below, as well as in Tables 3 and 4. Note that when multiple time-varying covariates and/or Level 2 predictors are included in the model, parameters reflect the effect when all other predictors are at the person or sample mean (i.e., have values of zero).
TABLE 3

RESULTS OF WITHIN-DAY MODELS
FOR NEGATIVE AFFECT

N = 244; *p<.05; **p<.01; ***p<.001

<table>
<thead>
<tr>
<th></th>
<th>Unconditional Model A</th>
<th>cDay Model B</th>
<th>PSS Model C</th>
<th>DSE Model D</th>
<th>PSS/DSE Model E</th>
<th>PSS*DSE Model F</th>
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### TABLE 4

RESULTS OF WITHIN-DAY MODELS
FOR POSITIVE AFFECT

N = 244; *p<.05; **p<.01; ***p<.001

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<tr>
<th>Fixed Effects</th>
<th>Unconditional Model A</th>
<th>cDay Model B</th>
<th>PSS Model C</th>
<th>DSE Model D</th>
<th>PSS/DSE Model E</th>
<th>PSS*DSE Model F</th>
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<td>55.04*** (5.05)</td>
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<td>45.87*** (4.29)</td>
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</table>
4.2.1 Model A: Unconditional means model

The results of the unconditional means model (A) can be used to calculate intraclass correlation (ICC) values, which serve to partition the variance of the daily outcome variables (NA and PA) into within- and between-person portions. The ICC formula divides the variance of the intercept ($\sigma_0^2$) by the sum of the intercept variance and error variance ($\sigma_0^2 + \sigma_e^2$) to arrive at the proportion of variance in the dependent variable attributable to between-person sources. The proportion of variance attributable to within-person sources can be found by subtracting this value from 1.0. Applying this formula to the results from the unconditional means model for NA, we find that in this data, 69.5% of the variability is attributable for between-person factors, and 30.5% is attributable to within-person factors. A similar pattern is found for PA: 70.5% of the variance is due to between-person sources, whereas 29.5% is due to within-person factors. These values indicate that there is enough within-person and between-person variability for both NA and PA to justify the addition of Level 1 (within-person) and Level 2 (between-person) predictors to the model, in an attempt to explain some of this variability.

4.2.2 Model B: Unconditional slope model

When a term testing for a (fixed) linear effect across the 56 days of the study was added to the models ($\gamma_{10}$), it was not significant for either NA (p = .291) or PA (p = .254); according to the pseudo $R^2$ ($\sigma_{e_1}^2 - \sigma_{e_2}^2/\sigma_{e_1}^2$), the day effect explained 0% of the variability in NA and PA. This is not surprising, since there is no reason to expect there to be a
systematic trend in mood across the study; because of its non-significance, the day term was not included in subsequent models for either NA or PA.

4.2.3 Model C: Effects of PSS

The model explaining a given day’s NA with that day’s level of perceived stress ($\gamma_{20}$; a random variable) and the individual’s mean level of perceived stress across the 56 days ($\gamma_{01}$; a fixed variable) revealed that both daily PSS ($p < .0001$) and mean PSS ($p < .0001$) are highly significant predictors of same-day NA, so that having a day of above average stress (for a given person) is related to more NA on that day, and so that having above average mean PSS (comparable to other participants), is associated with higher NA in general. The pseudo $R^2$ reveals that PSS accounts for 51.9% of the variance in NA. When this same model was run for PA, both daily PSS and mean PSS were again highly significant ($p < .0001$), indicating that an individual experiencing more perceived stress than usual do will likely report lower PA; the pseudo $R^2$ indicates that PSS explains 28.1% of the variability in PA.

4.2.4 Model D: Effects of DSE

The results of the model for NA including a term for the main effect of that day’s spiritual experiences ($\gamma_{30}$; a random variable) along with the individual’s mean level of spiritual experiences across the 56 days ($\gamma_{02}$; a fixed variable) demonstrated that a given day’s spiritual experience is related to same-day NA ($p < .0001$), so that an individual experiencing more DSE than usual (within-person) is likely to report less NA that day. The effect of mean level of DSE on NA is not significant ($p = .075$). The pseudo $R^2$ reveals that DSE accounts for 13.9% of the variance in NA. For PA, the effects of both
daily DSE and mean DSE were significant (p < .0001), indicating that an individual experiencing more DSE than usual on a given day will likely report higher PA on that day, and that an individual with above average mean DSE (compared to other participants), has higher PA in general. The pseudo $R^2$ demonstrates that DSE explains 13.3% of the variability in PA.

4.2.5 Model E: Effects of PSS and DSE

When terms for both PSS ($\gamma_{20}$) and DSE ($\gamma_{30}$) of a given day (random effects) are included in the model explaining that day’s NA, the main effect of DSE, which was significant in the DSE-only model, is no longer significant (p = .09), indicating a mediating effect.\(^2\) The main effect of PSS is significant on NA (p < .0001), so that higher PSS on a given day is associated with higher NA on that day. Mean level of PSS ($\gamma_{01}$) was also significant (p < .0001), indicating that higher mean PSS (between-persons) is associated with higher NA in general; mean level of DSE ($\gamma_{02}$) was not (p = .187). The pseudo $R^2$ comparing this model to the model including only PSS (Model C) reveals that DSE accounts for an additional 3.3% of the variance in NA over and above PSS; conversely, the pseudo $R^2$ comparing this model to the model including only DSE (Model D) reveals that PSS accounts for 46% of the variance in NA over and above DSE. When Model E was run for PA, the estimates for all four terms ($\gamma_{20}$, $\gamma_{30}$, $\gamma_{01}$, $\gamma_{02}$) were significant (p < .0001), indicating that experiencing lower perceived stress than usual on a given day is associated with higher PA that day; that experiencing more DSE than usual on a given day is associated with higher PA that day; that having above average mean PSS

\(^2\) For a complete discussion of the mediating effect indicated here, please see Appendix.
(comparable to other participants), is associated with lower PA in general; and that having above average mean DSE (comparable to other participants), is associated with higher PA in general. The pseudo $R^2$ comparing this model to the model including only PSS (Model C) reveals that DSE accounts for an additional 7.4% of the variance in PA over and above PSS; conversely, the pseudo $R^2$ comparing this model to the model including only DSE (Model D) reveals that PSS accounts for 23.2% of the variance in PA over and above DSE.

4.2.6 Model F: Daily moderator (buffer) model

In the final unconditional model (Model F) for NA including the PSSxDSE interaction term, the significance of the main effects for PSS and DSE remained the same as in the previous model: the effect of PSS on NA was significant ($\gamma_{20} = 0.38$, $p < .0001$), whereas the effect of DSE on NA was not ($\gamma_{30} = -0.02$, $p = .46$), indicating that being above average on PSS on a given day is associated with higher NA on that day. The interaction parameter ($\gamma_{40}$), or the effect of the interaction between PSS and DSE, was significant (-0.02, $p = .005$), indicating that there is a significant buffering effect of DSE on the impact of PSS on NA within a given day (see Figure 2 for a plot of this effect). Concerning the mean terms, mean level of PSS ($\gamma_{01}$) had a significant effect on NA ($p < .0001$), whereas mean level of DSE ($\gamma_{02}$) did not ($p = .95$). The pseudo $R^2$ comparing this model to the model without the interaction term (Model E) reveals that the PSS x DSE interaction effect accounts for an additional 4.6% of the variance in NA over and above the main effects of PSS and DSE.
Figure 2: Within-day interaction effect on NA; X = cPSS, Z = cDSE, and Y = NA. CVz1 = 1SD above the mean on DSE, CVz2 = mean DSE, and CVz3 = 1SD below the mean on DSE. Note that the means are within-person, rather than between person. A buffering effect of DSE is indicated by the difference in the effect of PSS on NA—the slope is steepest for days when DSE is 1 SD below the mean, and shallowest for days when DSE is 1 SD above the mean.

Similar results for the fixed effects were found when this model was run with PA as the outcome. Specifically, like in previous models for PA, both PSS and DSE main effects were significant ($\gamma_{20} = -0.63, p < .0001; \gamma_{30} = 0.62, p < .0001$). Unlike NA, however, the interaction parameter $\gamma_{40}$ was not significant for PA (0.007, $p = .575$). These results indicate that having a day of above average PSS is related to lower PA and having a day of above average DSE is associated with higher PA, but the two do not interact with one another to create a buffering effect within a given day. The effects of both mean terms ($\gamma_{01}, \gamma_{02}$) were significant for PA ($p < .0001$). The pseudo $R^2$ comparing this model
to the model without the interaction term (Model E) reveals that the PSS x DSE interaction effect accounts for an additional 1.4% of the variance in PA over and above the main effects of PSS and DSE.

4.3 Time-Lagged Models

The final unconditional model testing for the within-day effects (Model F—the buffering model) was applied to the lagged effects (as shown in models G and H above), adding in parameters to control for the previous day(s)’ mood (centered on the person mean and treated as fixed effects). Remember again that parameters reflect the effect when all other Level 1 and Level 2 predictors are at the person or sample mean (i.e., have values of zero). Results for 1-day and 2-day lagged models for both NA and PA are presented below, and in Table 5.

4.3.1 Model G: 1-day lag

When day $i$ values for PSS, DSE, and their interaction are used to predict NA on day $i+1$, controlling for NA on day $i$, the effect of NA$_i$ on NA$_{i+1}$ ($\gamma_{10}$) is significant (0.32, $p < .0001$); this parameter is used strictly as a control here, since one day’s level of NA is likely to influence the next day’s NA. The $\gamma_{30}$ parameter, which reflects the effect of PSS$_i$ on NA$_{i+1}$, was not significant (0.003, $p = .86$). The effect of DSE$_i$ on NA$_{i+1}$ ($\gamma_{40}$) was
TABLE 5

RESULTS OF LAGGED MODELS
FOR NEGATIVE AND POSITIVE AFFECT

N = 244; *p<.05; **p<.01; ***p<.001

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**Fixed Effects**

**Level 1**

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<td>0.32***</td>
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<td></td>
</tr>
<tr>
<td>cMood_{i+1}</td>
<td>( \gamma_{20} )</td>
<td></td>
<td></td>
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<td>0.34***</td>
</tr>
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<td></td>
</tr>
<tr>
<td>cPSS</td>
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<td>0.02</td>
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<td>-0.02</td>
</tr>
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<td></td>
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<td>(0.03)</td>
<td>(0.01)</td>
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<tr>
<td>cDSE</td>
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<td>-0.08</td>
<td>0.02</td>
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<td>(0.02)</td>
<td>(0.05)</td>
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</tr>
<tr>
<td>cDSE*PSS</td>
<td>( \gamma_{50} )</td>
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<td>0.01</td>
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<td>(0.006)</td>
<td>(0.01)</td>
<td>(0.007)</td>
<td>(0.01)</td>
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</tr>
</tbody>
</table>

**Level 2**

| mPSS      | \( \gamma_{01} \) | 0.56***| -0.83*** | 0.53*** | -0.83*** |
|           | (0.04)            | (0.08) | (0.04)   | (0.08)  |
| mDSE      | \( \gamma_{02} \) | 0.01  | 0.50***  | 0.01    | 0.48***  |
|           | (0.04)            | (0.09) | (0.04)   | (0.08)  |

**Random Effects**

**Within-person**

| cPSS      | \( \sigma_{c}^2 \) | 6.50***| 21.63*** | 6.84*** | 22.32*** |
|           | (0.09)            | (0.32) | (0.10)   | (0.33)  |
| cDSE      | \( \sigma_{c}^2 \) | 7.33***| 29.08*** | 5.92*** | 27.30*** |
|           | (0.73)            | (2.80) | (0.58)   | (2.61)  |
| cPSS      | \( \sigma_{c}^2 \) | 0.02***| 0.05***  | 0.01*** | 0.03***  |
|           | (0.003)           | (0.01) | (0.002)  | (0.01)  |
| cDSE      | \( \sigma_{c}^2 \) | 0.04***| 0.19***  | 0.02*   | 0.15***  |
|           | (0.01)            | (0.05) | (0.009)  | (0.04)  |
| cDSE*PSS  | \( \sigma_{c}^2 \) | 0.001*| 0.004*   | 0.003** | 0.004*   |
|           | (0.0006)          | (0.002) | (0.001) | (0.002) |
also not significant (0.011, p = .645). Contrary to the hypothesis, however, the interaction parameter ($\gamma_{50}$), which reflects the interaction effect of day $i$’s DSE and PSS on the next day’s NA was significant (0.018, p = .005). Note that the sign of this interaction parameter, which was negative in the within-day models, is now positive; this indicates that the interaction effect of DSE and PSS on NA changes in nature, so that what was a within-day buffering effect (bringing NA down) is actually predictive of slightly higher NA the next day (see Figure 3 for a plot of this effect). The mean terms for PSS ($\gamma_{01}$) and DSE ($\gamma_{02}$) were also included as between-person controls: the effect of mean PSS on the intercept was significant (0.56, p < .0001), indicating that higher mean levels of PSS are associated with a higher intercept on NA; but the effect of mean DSE on the intercept was not significant (0.01, p = .841).

Figure 3: Lagged interaction effect on NA_{lag1}; X = cPSS, Z = cDSE, and Y = NA_{lag1}. CVz1 = 1SD above the mean on DSE, CVz2 = mean DSE, and CVz3 = 1SD below the mean on DSE. Note that the means are within-person, rather than between person. Here, the effect of PSS on NA_{lag1} is worst when DSE is 1 SD above the mean, whereas it is best when DSE is 1 SD below the mean.
When day \( i \) values for PSS, DSE, and their interaction were used to predict PA on day \( i+1 \), controlling for PA on day \( i \), the effect of PA\(_i\) on PA\(_{i+1}\) (\( \gamma_{10} \)) is significant (0.32, \( p < .0001 \)); again, this parameter is used strictly as a control here, since one day’s level of PA is likely to influence the next day’s PA. The \( \gamma_{30} \) parameter, which reflects the effect of PSS\(_i\) on PA\(_{i+1}\), was not significant (-0.02, \( p = .45 \)). The effect of DSE\(_i\) on PA\(_{i+1}\) (\( \gamma_{40} \)) was also not significant (-0.08, \( p = .09 \)). Finally, the interaction parameter (\( \gamma_{50} \)), which reflects the average interaction effect of day \( i \)’s DSE and PSS on the next day’s PA was not significant (-0.015, \( p = .199 \)). The mean terms for PSS (\( \gamma_{01} \)) and DSE (\( \gamma_{02} \)) were also included as between-person controls: the effect of mean PSS on the intercept was significant (-0.83, \( p < .0001 \)), indicating that higher mean levels of PSS are associated with a lower intercept on PA; the effect of mean DSE on the intercept was also significant (0.50, \( p < .0001 \)), indicating that higher mean levels of DSE are associated with a higher intercept on PA.

4.3.2 Model H: 2-day Lag

Because the interaction parameter was significant for NA in the 1-day lag model, the 2-day lag model was run for both NA and PA. When day \( i \) values for PSS, DSE, and their interaction were used to predict NA on day \( i+2 \), controlling for NA on days \( i \) and \( i+1 \), the effect of NA\(_i\) on NA\(_{i+2}\) (\( \gamma_{10} \)) is significant (0.14, \( p < .0001 \)); the parameter for the effect of NA\(_{i+1}\) on NA\(_{i+2}\) (\( \gamma_{20} \)) was also significant (0.32, \( p < .0001 \)). Both \( \gamma_{10} \) and \( \gamma_{20} \) were included as controls, since NA is expected to be correlated across days. The effect of PSS\(_i\) on NA\(_{i+2}\) (\( \gamma_{30} \)) was not significant (-0.02, \( p = .08 \)); nor was the effect of DSE\(_i\) on NA\(_{i+2}\) (\( \gamma_{40} = 0.017, p = .44 \)). The interaction parameter (\( \gamma_{50} \)), which reflects the average interaction effect of day \( i \)’s DSE and PSS on NA\(_{i+2}\), was not significant (0.01, \( p = .14 \)).
The mean terms for PSS ($\gamma_{01}$) and DSE ($\gamma_{02}$) were also included as between-person controls: the effect of mean PSS on the intercept was significant (0.53, $p < .0001$), indicating that higher mean levels of PSS are associated with a higher intercept on NA; the effect of mean DSE on the intercept was not significant (0.013, $p = .745$).

When day $i$ values for PSS, DSE, and their interaction were used to predict PA on day $i+2$, controlling for PA on days $i$, and $i+1$, the effect of PA$_i$ on PA$_{i+2}$ ($\gamma_{10}$) is significant (0.12, $p < .0001$); the parameter for the effect of PA$_{i+1}$ on PA$_{i+2}$ ($\gamma_{20}$) was also significant (0.34, $p < .0001$). Both $\gamma_{10}$ and $\gamma_{20}$ were included as controls, since PA is expected to be correlated across days. The $\gamma_{30}$ parameter, which reflects the effect of PSS$_i$ on PA$_{i+2}$, was not significant (0.02, $p = .447$); nor was the effect of DSE$_i$ on PA$_{i+2}$ ($\gamma_{40} = -0.05$, $p = .31$). The interaction parameter ($\gamma_{50}$), which reflects the average interaction effect of day $i$’s DSE and PSS on PA$_{i+2}$, was not significant (-0.017, $p = .14$). The mean terms for PSS ($\gamma_{01}$) and DSE ($\gamma_{02}$) were also included as between-person controls: the effect of mean PSS on the intercept was significant (-0.83, $p < .0001$), indicating that higher mean levels of PSS are associated with a lower intercept on PA; the effect of mean DSE on the intercept was also significant (0.48, $p < .0001$), indicating that higher mean levels of DSE are associated with a higher intercept on PA.

4.4 Within-Day Conditional Models: Between-Person Effects

The global R/S indices (religious belief, religious practices, and daily spiritual experiences) were added to the Level 2 models for the final unconditional model testing for the within-day effects (Model F—the buffering model), as shown in models k1-k4 above. Once again, parameters reflect the effect when all other Level 1 and Level 2
predictors are at the person or sample mean (i.e., have values of zero). Results for the conditional models of both NA and PA are presented below, and in Table 6.

### TABLE 6

RESULTS OF BETWEEN-PERSON MODELS
FOR WITHIN-DAY NEGATIVE AND POSITIVE AFFECT

\(N = 200; \ *p < .05; \ **p < .01; \ ***p < .001\)

<table>
<thead>
<tr>
<th>Fixed Effects</th>
<th>Level 1</th>
<th>Intercept</th>
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<th>39.10***</th>
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<td>(2.63)</td>
</tr>
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<td>cPSS</td>
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<td>-0.64***</td>
<td>(0.02)</td>
<td>(0.04)</td>
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<td>cDSE</td>
<td>(\gamma_{30})</td>
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<td>0.63***</td>
<td>(0.02)</td>
<td>(0.06)</td>
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<td>(0.01)</td>
</tr>
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<td>(0.02)</td>
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<td>Level 2</td>
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<td></td>
<td></td>
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<td>(0.09)</td>
</tr>
<tr>
<td>mDSE</td>
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<td>(0.06)</td>
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</tr>
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<td>cRelPrac</td>
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<td>(0.005)</td>
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<td>(0.005)</td>
<td>(0.008)</td>
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<td>(0.01)</td>
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<td>(0.004)</td>
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44
4.4.1 Negative affect

The pattern of results for the fixed effects on NA at Level 1 was the same as it was for the within-day buffering model (F) above—the effects of PSS and the interaction were significant in the hypothesized directions, but the effect of DSE was not significant. The significant Level 2 main effect for mean PSS ($\gamma_{01} = 0.52, p < .0001$) demonstrates that higher mean PSS scores predict higher NA on the “average” day, and justifies its use as a covariate; the effect for mean DSE ($\gamma_{02} = 0.01, p = .92$) was not significant, but was still included as a covariate for consistency. None of the Level 2 effects of interest (global religious belief, religious practices, and daily spiritual experience) were significant for NA.
4.4.2 Positive affect

The pattern of results for the fixed effects on PA at Level 1 was the same as it was for the within-day buffering model (F) above—the direct effects of PSS and DSE were significant in the hypothesized directions, but the effect of the interaction was not significant. The significant Level 2 main effects for mean PSS ($\gamma_{01} = -0.88$, $p < .0001$) and mean DSE ($\gamma_{02} = 0.645$, $p < .0001$) demonstrate that these two Level 2 predictors impact the intercept for PA (higher mean DSE scores predict a higher PA intercept, whereas higher mean PSS scores predict a lower PA intercept), and justify their inclusion as covariates. Only one of the Level 2 effects concerning the global religious and spiritual indicators were significant for PA: religious practices had a negative impact on the intercept (-0.11, $p = .03$), so that higher global levels of religious practices were associated with lower PA on the “average” day; it should be noted, however, that because the intercept is not an interpretable parameter, the significant effect of RelPrac on the intercept is not very informative and should be considered with caution. Those Level 2 effects which would have better informed our hypotheses—that is, those impacting the Level 1 main effects and interactions—were not significant (see Table 3).
CHAPTER 5:

DISCUSSION

According to the theory of stress and coping, a coping resource is effective when it serves to reduce or eliminate the deleterious impact of stress on well-being (Aldwin, 2009; Lazarus & Folkman, 1984). Indicators of religiousness and spirituality have consistently been found to operate as effective coping resources on the global level (Pargament, 1997), ameliorating the harmful effects of negative life events (Ellison & Taylor, 1996), chronic health problems (McCauley et al., 2008), and perceived stress (Lee, 2007). Few studies, however, have examined whether and how the coping functions of religiousness and spirituality can be observed on the daily level, a context likely to be more reflective of the role that faith plays in the everyday lives of religious and/or spiritual individuals (Keefe et al., 2001). The current study sought to address this issue by investigating whether daily spiritual experiences serve as a buffer against the negative effect of daily perceptions of stress on daily mood (PA and NA), as well as whether these effects carry over beyond the current day and whether between-person differences in global religiousness and spirituality make a difference in the strength and/or presence of the daily associations. There were three primary findings, each of which will be addressed in turn. First, as was hypothesized, DSE buffers against stress for NA in day-to-day life; for PA, however, the impact of DSE is a direct one, positively impacting PA independent of perceived stress. Second, the results of the time-lagged analyses indicate
that the daily effects in large part do not carry over beyond the present day. Third and finally, contrary to hypotheses, global religiousness and spirituality do not impact the daily effects of DSE and PSS.

5.1 Within-Day Coping: DSE Is a Buffer for NA

The primary hypothesis—that daily spiritual experiences would buffer against the negative effects of perceived stress on mood—was partially supported by the results; the interaction effect between DSE and PSS was significant for NA, but not for PA. This indicates that, although daily spiritual experience does not directly impact NA when PSS is included in the model, it does serve to ameliorate the negative effects of PSS on NA through a moderating function. These results support the findings of Keefe et al. (2001), which suggested that DSE operates as a coping mechanism—helping chronic pain sufferers experience less negative affect and more positive affect than those with less DSE—and also extend them, demonstrating an explicit buffering effect of DSE on the negative effects of perceived stress on mood and providing further evidence for the efficacy of daily spiritual experience as a coping mechanism. The lack of a buffering effect on positive affect is likely a factor of the strong main effect found for DSE on PA—rather than operating on PA through an interaction with PSS (which did have a significant negative impact on PA as well), DSE seems to impact PA directly, independent of perceived stress.

So, when it comes to the relationship between perceived stress and daily affect, it appears that daily spiritual experience does come into play for both PA and NA, albeit in different ways: it serves a buffering function on NA, so that higher levels of DSE reduce the negative impact of stress negative affect; whereas it consistently boosts PA, both on
days when individuals do not feel stressed as well as on days when they do. This pattern of findings not only provides further evidence that NA and PA are separate and independent constructs rather than two poles of the same factor (Watson et al., 1988), but also demonstrates that daily spiritual experience functions as an effective coping mechanism against daily perceived stress for NA, whereas it exerts its direct benefits on PA independent of stress.

5.2 Carry-over Effects: Exacerbation, Buffering, or Artifact?

The second set of analyses concerned the tests of lagged effects. Although the hypotheses predicted that the main effects of PSS and DSE would continue to significantly impact both NA and PA in the 1- and 2-day-lag models, none of the main effects were significant for any of the lagged models. The only significant effect that emerged from the lagged analysis was for the interaction effect, which was significant for NA one day out. The sign of the effect is opposite from what would be expected, however: the parameter estimate for the interaction is positive, indicating that what was a buffering effect (with a negative sign) in the within-day model becomes an exacerbating effect the next day. This is an interesting finding, as it may shed light on the complex nature of religious/spiritual coping—although it is effective at buffering against stress on the day on which it is engaged, this effect does not carry over into the following day, and may actually make matters worse, as having an above-average buffering effect today is predictive of higher NA tomorrow. This finding has important implications for the understanding of the day-to-day role of religious/spiritual coping, and certainly calls for future studies to further investigate this effect.
The fact that the one significant finding of the lagged analysis was in the opposite direction of what was expected, however, begs for caution in interpretation, and also requires the exploration of potential alternative explanations which can be investigated by future researchers. One possibility is that there is actually no lagged effect of the interaction, and that this parameter is capturing something else entirely. For example, it may be that, rather than interacting with one another, the value of a given variable each day is only associated with the value of that same variable on the previous day(s), so that \( NA_i \rightarrow NA_{i+1}, DSE_i \rightarrow DSE_{i+1}, \) and \( PSS_i \rightarrow PSS_{i+1}, \) with the buffering effect occurring on a daily basis. In this case, if people are above their average on daily spiritual experiences today, above their average on stress today, and above their average on negative affect today, these values are also likely to be above average tomorrow (a post hoc analysis did find these direct across-day paths to be significant); because terms for \( DSE_{i+1} \) or \( PSS_{i+1} \) were not included in the model, it is possible that the interaction term is actually reflecting the direct associations between variables across days, rather than a lagged interaction effect per se.

A second explanation could be that by including the term controlling for affect on day \( i, \) the nature of the dependent variable changed; specifically, it may be that, rather than predicting next-day NA, the lagged models are actually predicting change in NA from one day to the next. In an effort to better understand what was going on here, post hoc analyses were run, leaving out the term controlling for the previous day’s NA; when this was done, the moderating effect was once again in the negative direction, indicating the presence of a lagged buffering effect. Further evidence that the sign of the interaction parameter may be an artifact of the controls is found when the mean \( NA_{\text{lag}1} \) is plotted
according to the values of PSS and DSE (see Figure 4)—here, it appears that, like the within-day moderating effect, the lagged effect is buffering, so that having above average DSE on day $i$ ameliorates the effect of PSS, on the next day’s NA (indicated by the slightly lower slope).

Figure 4: Plots of mean values for NA (top) and NAlag1 (bottom) for days when both PSS and DSE were below the person’s mean, days when both PSS and DSE were above the person’s mean, and days when one was above the mean while the other was below the mean. Note the steeper slope for the effect of PSS on NA and NAlag1 for those days of below average DSE.
A final possibility is that the inclusion of the many covariate and control terms made necessary by the complexity of the analysis accounted for so much of the variance in lagged NA and PA that the amount left over to be predicted by the variables of interest was more susceptible to the influence of outliers and undetected abnormalities in the data. Whether this lagged exacerbation effect actually exists or whether it is an artifact of some kind is an important question for future studies to address, as the answer has potentially significant implications for the understanding of the role of spiritual experiences in the day-to-day lives of older adults.

5.3 Between-person Effects: Global R/S Does Not Impact the Daily Coping Process

The third set of analyses concerned between-person effects—that is, whether global levels of religious practices, religious belief, and spiritual experiences impact the effects of the daily parameters. The only significant Level-2 result was found for the effect of religious practices on Level 1 intercept for positive affect, so that higher levels of global religious practices were associated with lower PA on the “average day”; because the intercept reflects PA when a person is at the mean on every variable in the analyses, however, this effect is not really interpretable. Future researchers interested in investigating this further can focus more specifically on the global effects of religious practices on affect, and thereby have more informative results.

The fact that none of the global religious/spiritual indicators explained individual differences on any of the daily main effects or interactions indicates that the daily associations between PSS, DSE, and mood do not depend on one’s global level of religiosity or spirituality. This may be due in part to the nature of the current sample, as the necessity for daily spirituality data necessarily means that the individuals included in
this analyses were higher and more homogeneous on global R/S measures; studies using
more diverse samples may be able to better assess the impact of these between-person
effects on daily stress-and-coping processes. When it comes to the lagged PA models, it
is possible that the inclusion of the mean DSE term—which was a highly significant
between-persons predictor for PA—as a control variable at Level 2 accounted for any
variance that would have been predicted by the global R/S indicators. The mean DSE
term did not have a significant effect in the lagged NA models, however, so it may be
that between-person differences in global religiousness and/or spirituality are simply not
predictive the daily effects on NA examined here.

5.4 Limitations, Considerations, and Future Directions

There are a few limitations that should be noted when considering the
implications of this study. First, daily spiritual experiences was the only
religious/spiritual indicator for which daily data was available; because there are so many
different dimensions of religiosity and spirituality, it is unlikely that the daily findings for
DSE are representative for all R/S variables. For this reason, it is important to examine
the daily associations of multiple R/S factors; we are currently collecting daily data on
religious practices, meaning/purpose, values/beliefs, commitment, and religious/spiritual
coping in order to be able to address this issue in a future project. A second limitation
concerns the relative homogeneity of the sample—participants are fairly well-educated,
community-dwelling, and predominantly Caucasian. The sample is, however,
representative of the demographic characteristics of the region from which it was drawn,
and also reflects a fairly broad SES range, being quite variable on income status. A
somewhat related issue is the fact that our sample only includes older adults (aged 55-
80), and the results are therefore not generalizable to other adult cohorts; data is currently being collected on a sample of midlife sample of adults (aged 31-60), which will allow a future project to explore these effects across a larger spectrum of the adult lifespan.

A third limitation concerns the possibility that this sample is higher and more homogeneous on religious and spiritual indices than the general public due to the religious affiliation of the University, as well as the fact that the necessity for daily spirituality data meant that those who did not endorse daily spirituality were excluded from the analyses; this could result in less variability in these measures, and potentially reduce their capacity to predict in our sample. A study conducted by an institution not affiliated with a religious tradition and/or with a more representative sample would be better able to assess these potential influences. Stemming from that, the results of this paper are only relevant for those who endorse at least some degree of daily spiritual experience—and thus consider themselves to be at least somewhat religious and/or spiritual individuals. Studies examining the mechanisms through which religiousness and spirituality convey their benefits, however, have found factors such as social support (Ellison, 1991; Wallace & Bergeman, 2002), perceived control (Jackson & Bergeman, 2010), and a sense of meaning and purpose (Park, 2005) to be significant mediators and/or moderators of the faith–well-being association. So it may be that the coping function of DSE, if it does operate through one of these more universal mechanisms, is reflective of the daily coping process common to all individuals, regardless of how religious and/or spiritual they are. Should this be the case, researchers interested in more general daily coping processes could consider investigating the role of these intermediate
mechanisms—social support, perceived control, meaning—which are relevant to everyone and permit generalization beyond the religious/spiritual population.

The final potential limitation is the use of perceived stress as the stress indicator. It has been argued that there is considerable conceptual overlap between PSS and affect, and some attest that this makes it an invalid predictor of mood and other psychological variables (Monroe & Kelley, 1997). Although this reality does have to be acknowledged, there is considerable evidence that perceived stress is more than a proxy for psychological disorder or distress (Cohen & Williamson, 1988). Further, the fact that there was a significant lagged effect in the present study is evidence that the within-day associations found here reflect more than just shared variance in PSS and affect. It is also important to note that the alternative to measures of stress appraisal—measures of stress exposure such as life event checklists—have problems of their own. Not only are there countless potential stressors not included in these lists, but people also vary individually on the degree to which they actually endorse/report life events. The reality is that there is no perfect measure of stress, and the best approach is probably to include measures of both stress exposure and stress appraisal in the model. Although this was outside the scope of the current project, daily life events data is available on this sample, and it is possible for a future project to add the stress exposure piece to the model tested here, thereby providing a more comprehensive picture of the stress-and-coping process.

5.5 Implications and Conclusions

The present study provided further support for the role of daily spiritual experience as an important coping resource for older adults. Not only was DSE found to have a significant buffering effect on the impact of perceived stress on same-day negative
affect, as was expected, but the findings also extended the current literature by demonstrating the differential coping function of daily spiritual experience for positive and negative affect. Further, this project is one of the first to examine the coping function of spiritual experiences on the daily level rather than using global measures which may or may not reflect the day-to-day associations of interest, and as such presents a number of avenues for future research. There is also potential for projects to build on the present findings by, for example, examining this daily coping process for additional dimensions of religiosity and spirituality, or investigating whether this process is different for adults at different points in the lifespan or from different religious/spiritual traditions.

The findings of this study also have practical clinical and/or community applications, providing further validation for the development of intervention programs such as that implemented by Goldstein (2007), in which participants took part in a 3-week-long, nondenominational program designed to teach them how to cultivate “sacred moments”—similar in nature to the daily spiritual experiences measured here—in their daily lives. The intervention was found to have significant positive effects on psychological well-being, subjective well-being, and feelings of stress. The success of this program, along with the findings of the present study, indicate that for religious and spiritual older adults, daily spiritual experiences can enhance daily well-being directly, as well as aid in coping with the stresses of life—particularly the day-to-day challenges that accompany the aging process—by both enhancing positive affect and buffering against the effects of perceived stress on negative affect.
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APPENDIX

ADDITIONAL FINDING: WITHIN-DAY MEDIATION

As mentioned in the introduction, questions concerning both moderation and mediation are common in stress-and-coping research, and although they address different questions, they are both informative approaches to investigating the stress-and-coping process. Because the focus of the present study was on the buffering (moderating) effects of daily spiritual experiences on the association between daily perceived stress and daily mood, the hypotheses did not address mediating effects; however, the fact that they surfaced in the results necessitates that they be discussed here. The fact that the effect of DSE on NA—which was significant without PSS in the model—is not significant in Model E indicates a within-day mediating effect in which the impact of DSE on NA is completely explained by PSS; in other words, DSE indirectly reduces NA by reducing feelings of stress. Indeed, the Sobel statistic, which is a test of mediation effects, was significant (-7.5, p < .0001). A similar function was present for PA: although the effect of DSE on PA is still highly significant when PSS is included in the model, the parameter estimate does decline considerably, from .90 to .62; the Sobel test showed that PSS was a significant mediator of the DSE → PA relationship (7.6, p < .0001), albeit a partial one. This indicates that along with enhancing PA directly on a daily basis, spiritual experiences also enhance PA indirectly by perceptions of stress. The mediating effects for both NA and PA are illustrated in Figure A1.
Referencing the simple stress-and-coping model in Figure 1, the direction of these mediation effects may seem opposite of what they should be; after all, does not the coping resource (in this case DSE) come after stress appraisal, rather than before? In actuality, more complex models of the stress-and-coping process (see Figure B2 from Aldwin, 2009, p.247) distinguish coping resources and coping efforts, and put them at different points in the stress-and-coping process. In the model in Figure B2, the process is essentially stress exposure→coping resources→stress appraisal→coping efforts→outcomes; this is quite similar to the model in Figure 1, the only difference
being the addition of the coping resources piece as a mediator of the link between stress exposure and stress appraisal. In light of this more complete model of the coping process, the mediating results found here make sense: if an individual is having a day in which he/she is having more or deeper spiritual experiences than usual, then stressors that occur on that day are appraised as less “stressful” than they would have been on a day when he/she is lower on DSE than usual; this lower level of perceived stress in turn benefits that day’s mood. Weaver and colleagues (2004) reached a similar conclusion: in a study looking at the coping processes of women with HIV, they found perceived stress to mediate the relationship between coping (denial and cognitive coping) and quality of life.

Figure A2. Stress and coping model from Aldwin, 2009, p.247. Note the progression from “individual coping resources” to “appraisal of stress” to “coping efforts” to “psychological effects.”
A note of caution: the causal language used here (e.g., DSE → PSS → Mood) applies theoretically and conceptually, but not statistically. Because all daily variables involved in the mediating effects discussed here (DSE, PSS, NA, and PA) were collected at a single point in time, the analyses reflect associations rather than directional effects, and as such should be interpreted with care. Post-hoc analyses using the lagged effects to look at across-time mediation were conducted in an effort to address this issue; however, no across-time mediation models were significant for either NA or PA, indicating that the mediating process occurs on the daily level, rather than across days. Daily studies taking multiple assessments each day (e.g., morning, noon, evening) would be better able to investigate causal nature of the within-day mediating process found here.

Although these mediating effects were not hypothesized and therefore did not inform the primary purpose of the paper, they do provide the opportunity to further investigate the function of daily spiritual experiences—and other dimensions of daily religiousness and spirituality—within the context of the more complex stress-and-coping model depicted in Figure B2. Specifically, it would be interesting to explore which dimensions of religiousness/spirituality operate more as coping resources (i.e., influencing stress appraisal), or whether they fit better with the coping efforts piece (i.e., mediating or moderating the impact of perceived stress on outcomes). Daily data including measures of multiple dimensions of religiousness and spirituality is in the process of being collected, and will permit a future study to investigate this process.