

RELIGIOUS COPING AND DAILY PAIN EXPERIENCE IN OSTEOARTHRITIS:
A MODERATED MEDIATION MODEL

by

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ABSTRACT

Objective: The current study explores the role of religious coping in the daily pain experience of African American and non-Hispanic White older adults with physician-confirmed knee osteoarthritis (OA). Methods: As part of a larger study of racial/ethnic differences in everyday quality of life with OA, 116 persons over the age of 50 completed global measures of pain (PGC Pain Scale) and religious coping (Brief RCOPE); daily variability in pain, coping, and affect was assessed using a daily diary methodology consisting of 4 daily phone calls over 7 days. Multilevel modeling was used to explore moderated-mediation effects of religious coping variables on the daily pain experience. Results: Participant demographics (race, sex) were only partially predictive of religious coping behaviors. A high intraclass correlation ($ICC = .92$) indicated minimal within-person variation in religious coping over the course of the week. Accordingly, analyses yielded no significant predictive power of level-1 variables (daily pain severity, daily religious coping). Bimodal distributions for daily religious coping suggest minimal variation between coping daily (31.9%) or not at all (31.9%). Inclusion of level-2 variables in the model demonstrated a significant moderating effect of coping type (positive vs. negative) on the relationship between the employment of religious coping and negative affect reported that day ($b = .096, SE = .043, p = .028$). Conclusions: Findings suggest that employment of religious coping strategies is more closely tied to person-level belief systems than within-day factors. Though challenging to measure on a daily basis, person-level endorsement of religious coping was closely associated with global measures of pain and disability. Implications for future research and clinical intervention are discussed.

DEDICATION

This thesis is dedicated to my parents, who are not expected to read this document in its entirety. And to my grandmother, Alberta, for sharing my accomplishments with so many restaurant servers over the years.

LIST OF ABBREVIATIONS AND SYMBOLS

α	Cronbach's alpha: a coefficient of internal consistency
b	Unstandardized regression coefficients
χ^2	Chi-square test statistic
CI	Confidence Interval: proportion of intervals containing true value of the parameter
df	Degrees of freedom: number of values free to vary after certain restrictions have been placed on the data
F	Fisher's F ratio: A ratio of two variances
ICC	Intraclass correlation coefficient
LB	Lower Bound confidence interval
M	Mean: sum of a set of measurements divided by number of measurements in the set
N	Total sample size
n	Subset of total sample size
p	Probability associated with the occurrence under the null hypothesis of a value as extreme as or more extreme than the observed value
r	Pearson product-moment correlation
SD	Standard deviation: amount of variation or dispersion of a set of data values
SE	Standard error: estimated error of the unstandardized regression coefficients
t	Computed value of t test
UB	Upper Bound confidence interval

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INTRODUCTION

It is expected that by 2030 there will be over 71 million adults aged 65 years or older living in the United States (Hootman, Brault, Helmick, Theis, & Armour, 2005). As the population of the U.S. continues to live longer, health issues affecting aging individuals become more prevalent and it is essential that these concerns be addressed. This study examines one of these health issues, osteoarthritis, in a sample of older adults and explores how religious coping interacts with the day-to-day experience of chronic pain associated with this disease.

Today, arthritis is the leading cause of disability amongst Americans (Hootman et. al, 2005). The most common form of arthritis is osteoarthritis (OA), a degenerative joint disease associated with chronic pain and functional disability. However, a growing body of research suggests that the impact of this chronic pain goes beyond physical symptomology and also affects an individual's psychological well-being (Adams et al., 2008; Parmelee, Harralson, Smith, & Schumacher, 2007; Stubbs et al., 2010). In order to provide sufficient care to individuals suffering from OA pain, it is critical to integrate psychological treatment with physical treatment. To accomplish this task, more research must first be conducted to fully understand the physical experience of chronic pain and its psychological impact on an individual.

Osteoarthritis

Past research has suggested that the impact of osteoarthritis is not uniform across gender and race. OA is more common in women, particularly African American women (Buckwalter, Saltzman, & Brown, 2004; Dominick & Baker, 2004; Srikanth et al., 2005). In addition to these variations in likelihood of diagnosis, there also exist differences in the way that OA affects an

individual. Women with OA, for example, have been found to experience higher intensity pain than men (Adams et al., 2008; Parmelee, Harralson, McPherron, DeCoster, & Schumacher, 2012; Stubbs et al., 2010). They also report greater levels of disability (Adams et al., 2008; Stubbs et al., 2010). Similarly, Parmelee et al. (2012) found that African Americans reported experiencing greater disability and higher intensity pain than Whites. And since there exist discrepancies in the way that osteoarthritis physically impacts individuals, it is reasonable to assume that there may also be differences in the ways that individuals are psychologically affected by osteoarthritis.

Pain & Mental Health

In recent years, there has been an increased effort made by the scientific community to examine the relationship between osteoarthritis and mental health. A study conducted by Parmelee et al. (2007) found OA pain to be associated with depressive symptoms. In addition, the study suggested that as an individual's health declines, his or her depression levels increase. This research contributes to a body of literature supporting this relationship between chronic pain and depression (Adams et al., 2008; Parmelee et al., 2007; Stubbs et al., 2010). Various epidemiologic studies indicate that women in general are more likely to exhibit symptoms of depression than are men (Altemus, 2006; Maciejewski, Prigerson, & Mazure, 2001; Weissman & Klerman, 1977). Accordingly, women suffering from chronic pain are also more likely to be depressed (Adams et al., 2008, Stubbs et al., 2010).

Upon establishing this link between chronic pain and depression and identifying dissimilarities in how different groups experience this relationship, it becomes important to evaluate differences in strategies used to manage the day-to-day experience of OA. The concept of coping strategies has become an area of increased interest amongst many researchers of

chronic pain. A study by Brown, Nicassio, & Wallston (1989), for example, suggested that coping strategies might be a better predictor of an individual's adjustment to chronic pain than pain magnitude or degree of disability. There are many different types of coping strategies that may be utilized to different degrees of effectiveness, but the current study concentrates on coping strategies that are religious in nature.

Religious Coping

Religious coping strategies consist of any coping behavior that is based on an individual's religious beliefs. This can include the performance of prayer, meditation, or hoping (Pargament, 1997). Previous research suggests that religious coping strategies are commonly employed in the experience of medical illness. Much like the experience of OA pain, religious coping has been shown to vary between individuals (Bearon & Koenig, 1990; Ellison & Taylor 1996; Ferraro & Koch, 1994). Conway (1986) found that in a sample of black and white urban elderly women, "thinking of God or your religious beliefs" was one of the most commonly reported cognitive responses to the stressful event of a medical problem. Koenig, Cohen, Blazer, Pieper, & Shelp (2010) found that one out of every five older medical inpatients endorsed religious-based thought/beliefs as their "most important" way of coping with illness. Similar results were reported by Koenig, Pargament, & Nielsen (1998), who further correlated "negative" and "positive" forms of religious coping with various outcome variables, such as quality of life, depression, and physical health.

Similar associations between religious coping and health outcomes have been documented in chronic pain populations. In a 2007 survey of individuals receiving treatment for chronic pain, Glover-Graf and colleagues found that 61% of respondents reported using prayer to cope with their pain, with 40% of individuals becoming more religious/spiritual following the

onset of their chronic pain condition. Rosenstiel & Keefe (1983) found that chronic low back pain patients who scored high on “diverting attention and praying” on the Coping Strategies Questionnaire (CSQ) had higher levels of both pain and functional impairment. Similarly, Rippentrop et al. (2005), found an inverse relationship between religious practice and physical health outcomes in a study of patients with chronic musculoskeletal pain.

Women are more likely to utilize religious coping strategies than men (Dunn & Horgas, 2004; Ellison & Taylor 1996; Ferraro & Koch, 1994; Sattler, Hamby, Winkler, & Kaiser, 1994). Similarly, African Americans have been shown to engage in higher amounts of prayer and hoping coping strategies than whites (Bearon & Koenig, 1990; Dunn & Horgas, 2004; Ferraro & Koch, 1994; Jones et al., 2008). In the previously cited study by Conway (1986), female older adults who identified as black were more likely to utilize prayer as a coping response to a medical problem than their white counterparts. These race and sex differences in religious coping have also been found in chronic pain populations, with women and African Americans reporting more frequent employment of religious coping strategies (Cano et al., 2006; Dunn & Horgas, 2004). A study conducted by Jones et al. (2008), using a sample of older veterans who were experiencing osteoarthritic pain of the hip or knee, concluded that in addition to using prayer more often, African Americans also exhibit a higher perception of prayer’s helpfulness in its application to osteoarthritic pain. In summary, both the prevalence and perceived efficacy of religious coping vary by demographic characteristics such as race and sex.

Research on religious coping has revealed that not only is it a commonly utilized coping method, but that it tends to have a positive impact on the individuals who employ it. A study conducted by Brant & Pargament (1995) concluded that religiousness has been associated with better outcomes in times of stress. Religious coping has also been found to be associated with

better mental health (Gass, 1987; Gray, 1987; Pargament, Smith, & Brant, 1995). When utilized in times of stress, methods of religious coping are generally related to maintaining a more positive affect (Rabins, Fitting, Eastham, & Zabora, 1990; Pargament et. al, 1995). Furthermore, a study by Koenig, Kvale, and Ferrel (1988) found the practice of religion to be associated with greater perception of coping efficacy. In other words, individuals who are engaged in methods of religious coping feel as if they are handling situations more proficiently. In summary, religious coping is not only an active component of dealing with stress, but there is evidence supporting its effectiveness in this role.

Measurement Issues

Existing literature on religious coping and its effects has not been consistent in its definition and/or measurement of what exactly constitutes “religious coping.” Some studies operationalize religious coping from a single item response (e.g., “importance of faith in coping with dialysis”, “felt closeness to God or nature in past few weeks”) and evaluate its relationship with a given outcome variable (O’Brien, 1982; Yates, Chalmer, James, Follansbee, & McKegney, 1981). Others utilize measures of spiritually based coping more closely tied to general religiousness or use of spiritual support (Pargament, 1997). As evidenced in the previous section, these condensed and/or unspecific operationalizations of religious coping have generally been linked to positive outcomes.

More in-depth exploration of religious coping strategies, such as those documented by Pargament (1997), however, differentiate between strategies that are “positive” vs. “negative” in nature. Isolated investigation of negative religious coping strategies (e.g., anger at God, doubts about God) has yielded associations with negative outcomes (e.g., negative mood) (Pargament et al., 2003). A handful of studies have also reported evidence for predictive effects of positive vs.

negative coping strategies, using positive (PRC) and negative (NRC) subscales of the Brief RCOPE. Tsevat et al. (2009) found that PRC scores at baseline were associated with quality of life improvements at both 12- and 18-month follow-up in participants with an HIV diagnosis. Ai, Seymour, Tice, Kronfol, & Bolling (2009) found pre-surgery NRC scores to be associated with greater levels of hostility and poorer adjustment in participants having undergone cardiac surgery. Similar investigation of the PRC and NRC subscales, however, found both types to be associated with stress-related growth (Pargament et al., 2011). Given the complex nature of religious coping, it is most likely that any given individual engages a combination of positive and negative strategies. In order to explore the unique effects of positive and negative religious coping, the current study operationalizes an individual's personal style of religious coping (i.e., his/her likelihood of engaging positive vs. negative strategies) using the ratio of positive (PRC) to negative (NRC) strategies s/he endorsed on the Brief RCOPE.

Global vs. Daily Approach

Although there are many studies that examine the effect of religiousness on various aspects of an individual's life and mental health, the majority have taken what can be considered a global measurement of religious faith and/or health experience. A global approach, for the purpose of the current discussion, can be defined as any measurement administered to participants at one singular point in time (e.g., "how often in the last week did you engage in X behavior?") and used to represent the frequency of X behavior generally over an extended period of time. This approach is common in the literature on both pain and religious coping due to its cost-effectiveness and relative ease of administration. Koenig, Kvale, and Ferrel (1998), for example, measured religious orientation with a two-item scale addressing frequency of church attendance and religious group activities. In the previously cited study by Brant and Pargament

(1995), religious coping was measured using a spiritually based coping scale, administered at a single point in time. In a similar fashion, Stubbs et al. (2010) assessed pain using the Brief Pain Inventory (BPI) severity scale, which prompts participants to report intensity of pain experienced throughout the past week. The results of these one-time global measurements, however, cannot reliably be generalized to any other place, date, or time other than that in which they were administered. In order to obtain a more truthful account of pain or religious coping experienced on a daily basis, measures of these constructs must also be administered on a daily basis (e.g., “did you engage in X behavior today?”).

In order to avoid inaccuracies associated with a global approach, the current study utilizes a daily approach to collect measures of religious coping and pain. Similar methodology has been employed in the literature on coping with rheumatoid arthritis, in two studies primarily focused on the role of perceived coping efficacy. A daily diary approach was used by Keefe et al. (1997) to explore the strategies used to cope with pain by individuals with rheumatoid arthritis. Participants completed 30 consecutive days of coping, pain, and mood measures in the form of a self-reported booklet (i.e., diary). Across persons, more frequent employment of pain coping strategies was associated with higher pain intensity. The effect of coping efficacy, however, was found significant only at the within-persons level of analysis. Within-person analyses linked greater coping efficacy with decreased pain and improved affect (Keefe et al., 1997). Results suggest that examining daily pain, coping, and mood in aggregate across-persons may potentially obscure unique, day-to-day associations of these variables within individuals. More recently, a second study by Keefe et al. (2001) explored the relationship between daily employment of religious coping and the lived experience of rheumatoid arthritis. This study also used a 30-day structured daily diary to collect data on spiritual experiences, religious coping (both general and

pain-specific), perceived coping efficacy, pain, mood, and social support. Key within-person findings included a significant correlation between perceived coping efficacy and measures of pain intensity, mood, and emotional/social support on any given day. On days that individuals felt more confident in their ability to control pain using religious coping strategies, they were less likely to be in pain or have a negative mood, and more likely to have a positive mood and report higher levels of emotional/social support. Additionally, frequency of spiritual experiences and coping efforts was related to daily mood and social support. The study, however, did not find a significant relationship between the frequency of religious coping behaviors and daily pain (Keefe et al., 2001).

The Current Study

As previously mentioned, existing literature supports the relationship between religious coping and better perceived coping efficacy, more positive affect, better mental health, and generally better outcomes in situations of stress. The majority of these studies, however, are formulated from data collected at one point in time measuring a variety of variables (i.e., global measurement). Aside from the work of Keefe et al. (2001), few studies examine the daily relationship between religious coping and chronic pain. The current study uses data collected from the Everyday Quality of Life in Osteoarthritis (EQUAL) project to examine the relationship between OA pain and religious coping at both the global and daily level. The EQUAL project is a multi-site longitudinal study examining the lived experience of individuals with osteoarthritis (OA). The purpose of the current study was twofold: (1) to confirm that demographic differences in religious coping established in the literature using global measures also exist at the daily level and (2) to examine the role of religious coping in the daily relationship between pain and negative affect.

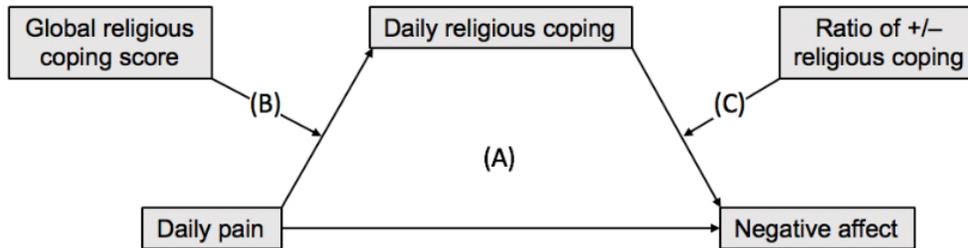
Hypotheses

Demographics. It was hypothesized that demographic characteristics (sex, race) would predict religious coping for pain at daily levels as well as global levels. Specifically, it was predicted that women and African Americans would use more religious coping for pain than their male and Non-Hispanic White counterparts at both the daily and global level.

Pain x coping x affect. Previous research has found religious coping to be associated with better outcomes in times of stress. Therefore, it was hypothesized that the strength of the relationship between daily pain and negative affect would differ depending on whether or not religious coping was employed that day. Because not all individuals are equally likely to engage religious coping strategies, global RCOPE scores were expected to predict the likelihood of religious coping at the daily level. Thus, it was hypothesized that the relationship between daily pain and whether or not religious coping is used that day would be stronger among individuals with higher global religious coping scores. In previous research, different types of religious coping (positive vs. negative) have been found to produce differential outcomes. Positive religious coping strategies are generally related to spiritual well-being and positive psychological outcomes, while negative strategies are associated with opposite constructs (e.g., anxiety, pain, depression). It was therefore hypothesized that the relationship between use of religious coping and negative affect on a given day would depend on the ratio of positive to negative religious coping strategies globally employed by that individual, with more positive strategies associated with better outcomes. The anticipated relationship(s) among daily pain, religious coping, and negative affect are represented by a moderated mediation model, with moderations examined on two of the three paths (see Figure 1).

Figure 1

Hypothesized Moderated Mediation Model



Note. (A) The relationship between pain and negative affect on a given day will be mediated by whether or not religious coping was used that day. (B) An individual's global religious coping (RCOPE) score will moderate the relationship between his/her daily pain experience and whether or not daily religious coping is employed that day. (C) An individual's global ratio of positive to negative religious coping strategies (derived from RCOPE) will moderate the relationship between his/her employment of daily religious coping and negative affect on that day.

METHODS

Participants

Data were drawn from the Everyday Quality of Life in Osteoarthritis (EQUAL) project, a longitudinal, multi-site study examining everyday quality of life in older adults with physician-diagnosed knee osteoarthritis. Participants in the current study were 116 individuals (20 males, 96 females) over the age of 50 ($M_{age} = 63.91$; $SD = 8.802$) recruited from sites in Tuscaloosa, AL ($n = 64$) and Stony Brook, NY ($n = 52$). Participants were non-Hispanic White ($n = 48$) or African American ($n = 68$); individuals identifying as any other race were excluded from participation. See Table 1 for a full description of participant characteristics.

The majority of EQUAL participants were recruited from medical center outpatient clinics, local private rheumatology practices, print advertisements, and contact with Federally Qualified Health Centers. Excluded from participation were individuals who self-reported having rheumatoid arthritis, fibromyalgia, or lupus. In addition, participants reporting any other life-threatening or chronic illnesses or conditions (e.g., cancer, emphysema) were also deemed ineligible for participation. Upon fulfillment of all other requirements, a Short Portable Mental Status questionnaire was administered during recruitment to ensure that participants retained normal mental functioning (Pfeiffer, 1975). Participants who exhibited cognitive impairment, as evidenced by a score < 6 correct on this 10-item measure, were excluded from the study.

Table 1*Participant Characteristics*

	Non-Hispanic Whites (N = 48)				African Americans (N = 68)			
	Males (N = 10)		Females (N = 38)		Males (N = 10)		Females (N = 58)	
	Mean/N	SD/%	Mean/N	SD/%	Mean/N	SD/%	Mean/N	SD/%
Recruitment site								
<i>Stony Brook, NY</i>	3	30%	22	57.89%	5	50%	22	37.93%
<i>Tuscaloosa, AL</i>	7	70%	16	42.11%	5	50%	36	62.07%
Age in years	63	8.97	65.37	8.21	61.20	7.53	63.59	9.38
Marital Status								
<i>Coupled/Cohabiting</i>	9	90%	12	31.58%	6	60%	17	29.31%
<i>Single/Widowed</i>	1	10%	26	68.42%	4	40%	40	68.97%
<i>Declined to answer</i>	–	–	–	–	–	–	1	1.72%
Education								
<i>≤ High school</i>	2	20%	11	28.95%	2	20%	23	39.66%
<i>Vocational training or some college</i>	2	20%	13	34.21%	6	60%	22	37.93%
<i>College graduate</i>	5	50%	7	18.42%	1	10%	6	10.34%
<i>Graduate/professional degree</i>	1	10%	7	18.42%	1	10%	6	10.34%
<i>Declined to answer</i>	–	–	–	–	–	–	1	1.72%
AIMS Disability Mean	.44	.43	.67	.48	.62	.53	1.03	.82
RCOPE Mean	1.85	.65	1.86	.53	2.06	.49	2.26	.51
<i>Positive subscale mean</i>	2.56	1.05	2.59	.91	2.81	.77	3.17	.75
<i>Negative subscale mean</i>	1.14	.40	1.13	.28	1.31	.55	1.35	.46
PGC Pain Mean	2.91	.67	3.19	.95	3.06	1.19	3.37	1.08
Proportion of days religious coping was employed	.37	.44	.45	.43	.39	.43	.60	.43

Procedure

The EQUAL study used both cross-sectional and longitudinal data collection methods to explore the interplay of biological, social, and psychological factors at both the global and daily levels of measurement. Global measures of these factors were collected in a comprehensive baseline interview by trained research assistants (RAs), followed by 7 days of experience sampling method (ESM) procedure. Experience sampling is a research procedure designed to capture data from participants during their daily lives. Typically, ESM involves asking

individuals to provide systematic self-reports at random occasions during the waking hours of a normal week (Larson & Csikszentmihalyi, 1983). ESM procedure for EQUAL consisted of both actigraphic data capture and four daily telephone calls for one week. However, for the context of the current study, actigraphy data from EQUAL will not be used.

Experience Sampling

Telephone calls lasting approximately 5 to 10 minutes were used to capture information on activity engagement, pain, mood, and employment of coping behaviors. Measures of pain and affect were collected during all phone calls; employment of religious coping was collected only on the final call of the day (Call 4). Placement of calls was randomized in 3-hour time blocks (e.g., 9:00 am – noon). Cellular phones were made available by the research team for anyone who did not prefer to use their personal devices. Three attempts at contact were made within a call block; participants were instructed to return missed calls at their earliest convenience. Each individual repeated all project activities (interview, 7-day ESM) one year later (Time 2) as a means of collecting longitudinal data for each participant.

Measures

In addition to participant demographic information (sex, race), the current study utilizes measures of pain, religious coping, and negative affect collected by the EQUAL project. Global measures are embedded within the baseline/follow-up interviews, and daily measures were collected using ESM daily phone calls.

Global Measures

Religious Coping. A global measure of religious coping was collected using the Brief RCOPE (Pargament, Feuille, & Burdzy, 2011). The Brief RCOPE is a 14-item scale designed to measure religious coping with major life stressors (see Appendix). The scale can be divided into

two subscales, positive religious coping (PRC) (e.g. “Sought God’s love and care”) and negative religious coping (NRC) (e.g., “Wondered what I did for God to punish me”). Respondents are prompted to rate how often they engage in each spiritual coping activity on a scale of 1 (not at all) to 4 (a great deal). The Brief RCOPE has been shown to maintain good internal consistency in application with a variety of populations (e.g., cancer patients, outpatients with alcohol use disorders, HIV patients) (Pargament, et al., 2011). The median Cronbach’s alpha scores for the PRC and NRC found in these populations were 0.92 and 0.81, respectively. Concurrent validity of both the positive religious coping items and the negative religious items have also been established, with positive items consistently being related to spiritual well-being and positive psychological constructs and negative items being associated with opposite constructs (e.g., anxiety, pain, depression) (Pargament, et al., 2011). The current analysis computed mean scores from the total Brief RCOPE scale and the means of both subscales (PRC and NRC). The standardized Cronbach alpha for the Brief RCOPE in the current sample was .892. Positive (PRC) and negative (NRC) subscales yielded alpha values of .929 and .770, respectively.

Pain. Global pain intensity was assessed using the Philadelphia Geriatric Center (PGC) Pain Scale (Parmelee, 1994). The PGC Pain Scale is a 6-item measure that prompts participants to report how often they experienced pain in the past month on a 5-point scale ranging from “not at all” to “extremely”. Cronbach’s alpha for the PGC Pain Scale in the current study was .887. Each participant's mean PGC Pain Scale score was computed and used to represent his or her global pain intensity.

Disability. Disability was measured with 28 items from the Arthritis Impact Measurement Scales (AIMS) health status questionnaire, second edition (Meenan, Mason, Anderson, Guccione, & Kazis, 1992). The AIMS comprises 6 subscales measuring mobility,

walking and bending, hand and finger function, arm function, self-care, and household task performance. The overall index of disability used in analysis represents the average of mean scores from all 6 subscales ($\alpha = .941$).

Daily Measures

Daily pain was assessed four times per day over the telephone by asking participants to rate the intensity of pain experienced on a 1 to 5 scale from “not at all” to “extremely.”

Participants were then asked to cite the location of their pain. Because the current study is interested in daily pain (rather than its fluctuation over the course of the day), analyses use the average of pain ratings from the four daily calls to represent that day’s pain experience.

Positive/negative affect data was also collected in all four daily calls, using the 10-item PGC Positive and Negative Affect Scales (Lawton, Parmelee, Katz, & Nesselroade, 1996). Given the relatively well-established association between pain and negative affect (Affleck, Tennen, Urrows, & Higgins, 1991; Fernandez & Milburn, 1994; Gaskin, Greene, Robinson, & Geisser, 1992; Passchier et al., 1992; Summers, Rapoff, Varghese, Porter, & Palmer, 1991; Wade, Price, Hamer, Schwartz, & Hart, 1990; Zautra et al., 1995), the current study utilizes only the negative affect items as an outcome measure. Because negative affect is expected to fluctuate throughout the day, the daily mean of negative affect items was computed. Daily employment of religious coping was determined during the final call of each day (occurring between 6:00 and 9:00 pm) by asking participants a yes/no coded question: “Did you pray, meditate, or turn to spirituality as a means of coping with your pain today?” For the purposes of global analyses, daily employment of religious coping was aggregated using the composite score of “yes” responses across total days of experience sampling.

Data Analyses

Data Management

Data collection for the EQUAL study is complete and all interview/ESM call data has been entered into a digital database housed within the Alabama Research Institute on Aging (ARIA). Data points eligible for inclusion in the present study were exported into a separate file and imported into SPSS statistical software. Additional demographic variables (e.g., age, educational attainment, marital status) were also pulled from the EQUAL dataset so that they could be statistically controlled as possible confounding variables.

Because key measures of interest to the current study (Brief RCOPE, daily religious coping ESM item) were not introduced to the EQUAL study until the third year of data collection, only participants for whom sufficient data was available were used for the current study. Brief RCOPE data with fewer than 6 valid items on either 7-item subscale (PRC, NRC) were excluded from the dataset. Because religious coping was only collected during the final call of the day, participants for whom fewer than four days of evening (i.e., 6:00 – 9:00 pm) call data was collected were removed from analysis. For participants with eligible data collected at both baseline (T1) and one-year follow-up (T2), longitudinal elements were removed by defaulting to the inclusion of T2 data. The resulting dataset comprises data points from 116 unique participants collected either during their baseline ($n = 24$) or follow-up ($n = 94$) involvement in the EQUAL project.

Preliminary Analyses

Descriptive preliminary analyses (e.g., ANOVA, simple correlations) were used to assess eligibility of potential covariates for inclusion in the multi-level model; only disability status and race met eligibility criteria ($p < .05$) for inclusion. Statistical assumptions of normal distribution

for the Brief RCOPE, PGC Pain Scale, and Arthritis Impact Measurement Scales (AIMS) were determined by examining each scale's histogram and Q-Q normality plots. Shapiro-Wilk test statistic values ($p > .05$) were used to confirm that observed scores for each scale did not violate the assumption of normality. Person-level means of daily measures (pain, negative affect) were computed and Q-Q normality plots were visually inspected for outliers. Because negative affect represents both a continuous variable and repeated measure, variability of responses were visually assessed using case summary tables aggregated by subject ID. Invariant responders ($n = 20$) were retained in the dataset as their lack of deviation impacts power, but not validity of level-1 associations.

Analytic Plan

Two-way ANOVAs were used to examine demographic differences in religious coping. Bivariate correlations were computed among pain, religious coping, negative affect, and participant characteristics (e.g., age, disability status). Relationships among the variables of interest were explored using the moderated mediation model conceptualized in Figure 1. Because daily data points collected over 7 days are nested within subjects, the model cannot be analyzed using a PROCESS macro (Hayes, 2013). Instead, the hypotheses were examined in stages, using a combination of logistic modeling (see Aguinis et al., 2013) and Baron & Kenny's (1986) regression technique in a series of multilevel models.

Hypotheses were explored in four stages. (1) Logistic multi-level modeling was used to test the moderating effect of RCOPE scores on the relationship between daily pain and daily religious coping ("B", Figure 1). (2) Multilevel moderated regression analysis was used to test the moderating effect of the type of religious coping (i.e., positive vs. negative) on the relationship between daily religious coping and negative affect ("C", Figure 1). (3) Multilevel

mediation analysis was used to test daily religious coping as a mediator of the relationship between daily pain and negative affect ("A", Figure 1). (4) The entirety of the model was tested by stepping significant moderators from Stages 1-2 into the final statistical model of Stage 3.

RESULTS

Correlation coefficients were used to test initial associations between participant demographics and variables of interest (see Table 2).

Pain. Global pain (measured at baseline using PGC Pain Scale) was moderately correlated with average pain levels reported at the daily level ($r = .505, p = .000$). Global pain was also associated with greater reliance on religious coping at both the global (RCOPE; $r = .253, p = .006$) and daily level ($r = .224, p = .016$). Further, the effect held for both positive ($r = .192, p = .039$) and negative ($r = .273, p = .003$) religious coping. Daily pain was similarly associated with religious coping, but only at the daily level (proportion of days religious coping reported; $r = .259, p = .005$). Higher levels of daily pain were only significantly associated with greater endorsement of negative religious coping strategies at the global level (RCOPE NRC; $r = .221, p = .017$).

Negative affect. Correlation coefficients tested the association of each participant's average report of daily negative affect with all of the variables of interest. Greater negative affect (i.e., worse mood) was associated with increased endorsement of negative religious coping strategies (RCOPE NRC; $r = .244, p = .008$) and greater pain at both the global (PGC pain; $r = .246, p = .008$) and daily level (mean daily pain; $r = .280, p = .002$). Daily negative affect was also positively correlated with disability (AIMS mean; $r = .508, p = .000$).

Disability. Two-way ANOVAs of sex (male, female) and race (NHW, AA) on mean AIMS scores did not yield any significant main or interaction effects. Disability, however, was found to be highly correlated with several other variables of interest. Greater disability was

associated with greater pain at both the global (PGC pain; $r = .546, p = .000$) and daily level ($r = .494, p = .000$). There was also a strong, positive, statistically significant relationship between mean AIMS scores and mean RCOPE scores, with greater levels of disability related to global reports of more frequent religious coping ($r = .288, p = .002$). This relationship held for both positive (PRC) ($r = .204, p = .028$), and negative (NRC) RCOPE subscale scores ($r = .337, p = .000$). Similarly, the extent of participant disability was positively associated with more frequent employment of religious coping at the daily level, $r = .331, p = .000$.

Table 2

Correlations of Participant Demographics and Measures of Interest

		Global Measures ^a				Demographics			Daily Measures			
		RCOPE	PRC	NRC	Pain	AIMS	Race	Sex	Age	Pain ^b	RC	NA ^b
Global Measures ^a	Brief RCOPE	1	.940**	.702**	.253**	.288**	.329**	.100	-.070	.150	.294**	.157
	PRC subscale	.940**	1	.417**	.192*	.204*	.303**	.112	-.014	.084	.320**	.084
	NRC subscale	.702**	.417**	1	.273**	.337**	.247**	.029	-.168	.221*	.114	.244**
	PGC pain	.253**	.192*	.273**	1	.546**	.094	.115	-.152	.505**	.224*	.246**
	AIMS disability	.288**	.204*	.337**	.546**	1	.246**	.193*	.039	.494**	.331**	.508**
Demographics	Race	.329**	.303**	.247**	.094	.246**	1	.080	-.092	.019	.151	.077
	Sex	.100	.112	.029	.115	.193*	.080	1	.094	.148	.145	.141
	Age	-.070	-.014	-.168	-.152	.039	-.092	.094	1	-.023	.187*	-.139
Daily Measures	Pain ^b	.150	.084	.221*	.505**	.494**	.019	.148	-.023	1	.259**	.280**
	Religious Coping (RC)	.294**	.320**	.114	.224*	.331**	.151	.145	.187*	.259**	1	.114
	Negative Affect (NA) ^b	.157	.084	.244**	.246**	.508**	.077	.141	-.139	.280**	.114	1

Note. R = Pearson's correlation.

^a mean score. ^b average across days. ^c proportion of days religious coping was reported

** significant at the 0.01 level (2-tailed). * significant at the 0.05 level (2-tailed).

Demographics and Brief RCOPE

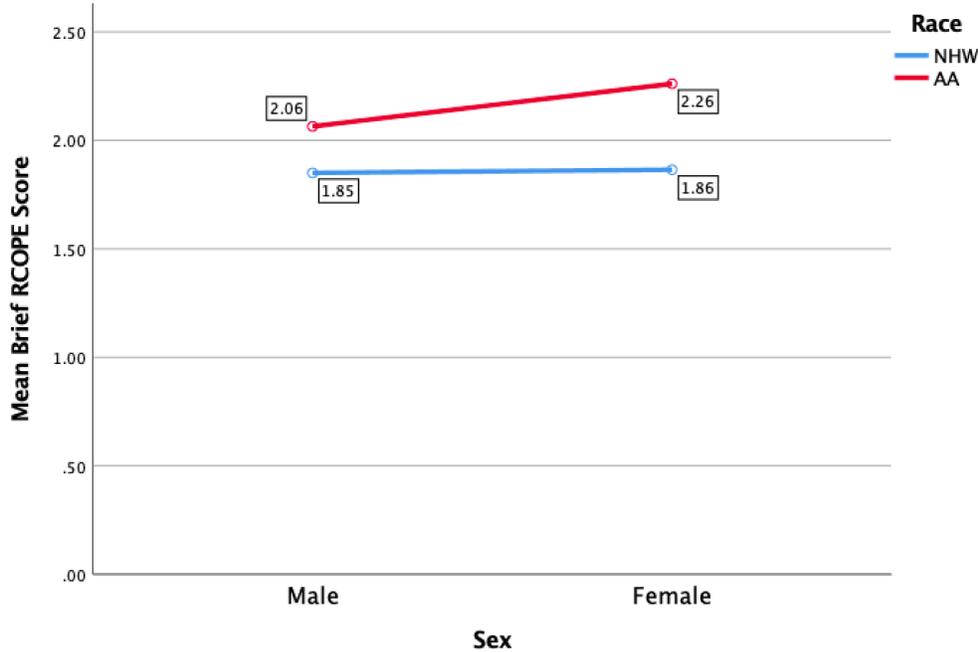
To test the hypothesis that demographic characteristics would predict religious coping at the global level, a two-way ANOVA of sex (male, female) and race (NHW, AA) on RCOPE scores was conducted. The main effect of sex on RCOPE scores was not significant, $F(1, 112) = .650, p = .422$. Sex did not predict religious coping at the global level. A significant main effect of race on RCOPE scores, however, was found, $F(1, 112) = 5.443, p = .021$ (See Figure 2). African American participants had significantly higher RCOPE scores ($M = 2.2318, SD = .5111$) than their non-Hispanic White counterparts ($M = 1.8615, SD = .5518$). The sex x race interaction was not significant, $F(1, 112) = .483, p = .488$. Racial differences in Brief RCOPE scores remained significant when analysis of covariance (MANCOVA) was used to include potential confounds of age, education, and marital status in the model. The covariate of marital status (coupled vs. single) was significantly associated with the frequency of daily religious coping, with single participants ($M = .612, SD = .419$) coping more than their coupled ($M = .355, SD = .416$) counterparts, $F(1, 113) = 10.256, p = .002$.

Demographics and Daily Religious Coping

To determine whether demographic characteristics predicted religious coping at the daily level, a two-way ANOVA of sex (male, female) and race (NHW, AA) on the proportion of study days involving religious coping was conducted. Contrary to the hypotheses, these analyses yielded no significant main nor interaction effects of demographic variables on daily religious coping. Neither participant sex nor race predicted utilization of religious coping at the daily level.

Figure 2

The Main Effect of Race on RCOPE Scores



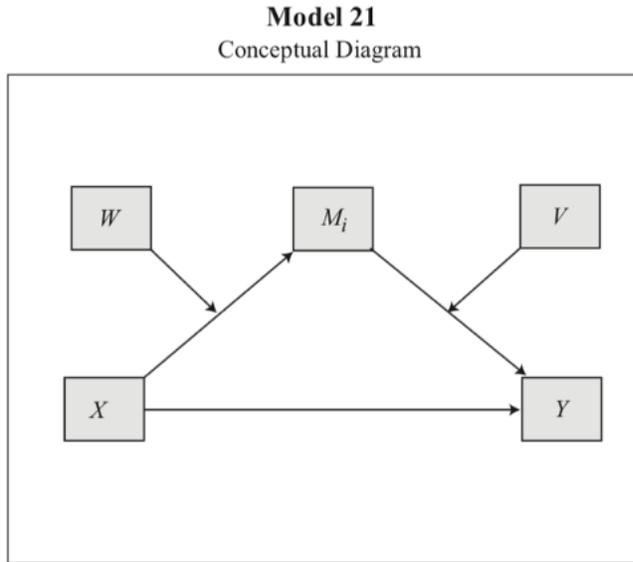
Note. African American (AA) participants had significantly higher RCOPE scores than their non-Hispanic White (NHW) counterparts, $F(1, 112) = 5.443, p = .021$.

Daily Pain x Religious Coping x Negative Affect

The proposed relationships among the variables of interest can be conceptually represented using Hayes' (2013) Model 21 template (see Figure 3). Because daily data points collected over 7 days are nested within subjects, however, the proposed multi-level moderated mediation model cannot be analyzed using a PROCESS macro. Instead, the hypotheses were examined in stages, using a combination of logistic modeling (see Aguinis et al., 2013) and Baron & Kenny's (1986) regression technique in a series of multilevel models. To assist with reader conceptualization, the following analytical plan is intended to align with the notational formatting of Figure 3.

Figure 3

Conceptual Diagram of Statistical Analysis



Note. Adapted from Hayes, A. F. (2017). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach*. Guilford Publications.

Stage 1. The moderating effect of RCOPE scores (W) on the relationship between daily pain (X) and daily religious coping (M_i) was assessed using multilevel logistic modeling. The analytic procedure for this leg of the model was selected based on the dichotomous nature of the outcome, daily religious coping (M_i , i.e., 0 = 'no', 1 = 'yes'). Logistic modeling—as opposed to linear regression—allows for the conditional prediction of a dichotomous outcome variable's *likelihood of occurrence*, rather than its predicted value. The logistic procedure tested two predictor variables. The first predictor variable (daily pain) is level-1 since it may vary within clusters (i.e., within people). The second predictor (mean RCOPE scores) is level-2, since it cannot vary within clusters (i.e., it is a between-person variable; Aguinis et al., 2013).

Upon testing the degree of intra-individual variability, the null model yielded an intraclass correlation (ICC) of .92, indicating that 92% of the total variability was between rather

than within individuals. ICC estimations from the random intercept logistic model may range from 0 to 1, with ICC = 0 indicating perfect independence of residuals. Conversely, an ICC value of 1 represents total *interdependence* of residuals (i.e., observations vary only between clusters). An ICC value of .92 in the context of the current analysis suggests that although participants differ substantially from one another, each individual is largely consistent in his or her own report of religious coping over the week of data collection (Wu et al., 2012). Table 3 depicts the proportion of days religious coping was employed by the 116 participants. The majority of participants ($n = 74$, 63.8%) have proportion values of 0 or 1, indicating that they either did not use any religious coping at all during the week of data collection or they reported religious coping strategies every single day, respectively. For the purposes of this thesis, the multilevel model proceeded despite the marked within-person invariance.

An intermediate logistic model was used to determine the effect of daily pain on daily religious coping. When entered independently, daily pain ($b = -0.429$, $SE = 1.427$) was not a significant predictor of daily religious coping, $F(1, 681) = 0.090$, $p = .764$. The implications of failing to establish this direct effect are discussed in Stage 3. The final model consisted of both level-1 and level-2 variables, as well as the cross-level interaction term. The overall model was significant, $F(3, 679) = 4.423$, $p = .004$. A direct effect of RCOPE scores on daily religious coping appeared to be driving this significance, ($b = -1.538$; $SE = 0.474$, $p = .001$). Religious coping on any given day of the study was more likely among participants whose RCOPE scores were higher. The RCOPE predictor remained significant ($b = -1.117$, $SE = 0.507$, $p = .028$) even after including disability ($b = -1.115$, $SE = .401$, $p = .006$) and race ($b = 0.149$, $SE = .556$, $p = .789$) as covariates in the model. As in the intermediate model, daily pain failed to be predictive of daily religious coping ($b = -0.210$, $SE = 1.037$). The interaction of RCOPE scores with daily

pain was also not a significant predictor in the model ($b = -0.091$, $SE = 0.438$). In summary, the logistic procedure (1) yielded a significant, direct effect of RCOPE scores on daily religious coping but (2) failed to support the hypothesized moderating effect of RCOPE scores on the relationship between daily pain and daily religious coping.

Table 3

Proportion of Days Religious Coping was Employed

Proportion	Frequency	Percent	Cumulative Percent
.00	37	31.9	31.9
.14	2	1.7	33.6
.17	5	4.3	37.9
.20	3	2.6	40.5
.25	2	1.7	42.2
.33	3	2.6	44.8
.40	1	.9	45.7
.43	1	.9	46.6
.50	4	3.4	50.0
.67	2	1.7	51.7
.71	5	4.3	56.0
.75	1	.9	56.9
.80	3	2.6	59.5
.83	7	6.0	65.5
.86	2	1.7	67.2
.88	1	.9	68.1
1.00	37	31.9	100.0
Total	116	100.0	

Stage 2. To assess the moderating effect of the type of religious coping (i.e., positive vs. negative) (V) on the relationship between daily religious coping (M_i) and negative affect (Y), multilevel moderated regression analyses were conducted using Baron & Kenny's (1986) regression technique. In step 1, level-1 negative affect (Y) was regressed on level-1 daily religious coping (M_i). In the second step, level-2 coping type (V) was added. In step 3, the cross-

level interaction term of daily religious coping (M_i) x coping type (V) was entered into the model.

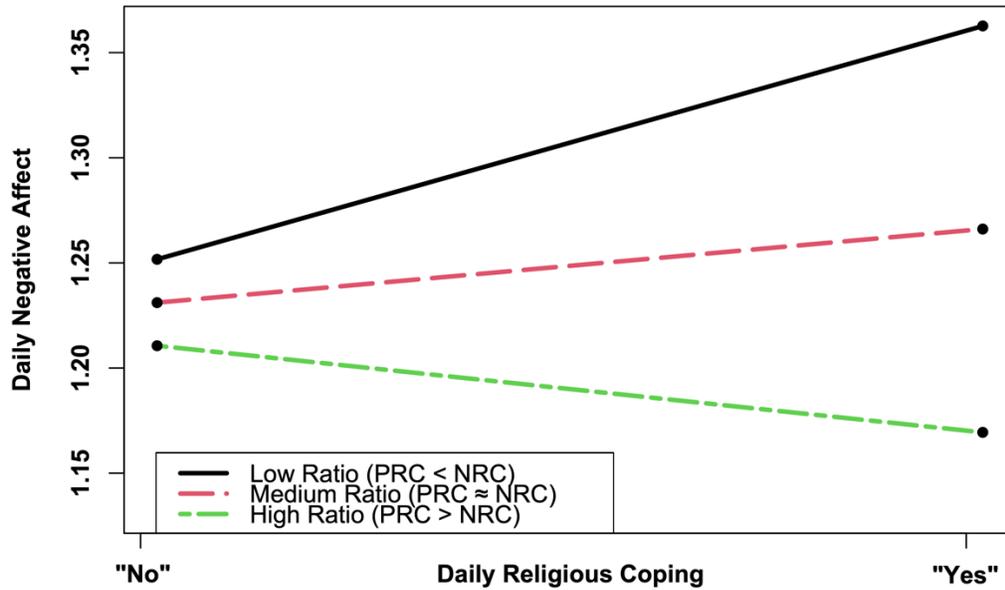
The regression of negative affect on daily religious coping did not yield a statistically significant model, $F(1,667.790) = .373, p = .542$. Daily religious coping was not a significant predictor ($b = .019, SE = .031$) of negative affect reported that day. Entering type of religious coping into the second model failed to yield any significant main effects of either daily religious coping ($b = .022, SE = .031$) or coping type ($b = -.067, SE = .049$).

The results from the full model indicated there was a significant interaction (M_iV) between employment of daily religious coping and coping type ($b = -.096, SE = .043, p = .028$). The interaction effect is depicted by simple slopes in Figure 4. On days when prayer was utilized, individuals with a tendency to employ negative coping strategies experienced more negative affect. The log likelihood of the final model (196.001) had decreased from the second model (200.831), indicating significantly better fit ($\chi^2_{(1)} = 4.83, p < .05$). This interaction effect remained significant ($b = .085, SE = .043, p = .047$) even after including disability ($b = .012, SE = .051, p = .000$) and race ($b = .033, SE = .071, p = .639$) as covariates in the model.

The full model also yielded a significant main effect for daily religious coping. Because this effect appears alongside a significant interaction, however, it is considered to be 'conditional' (i.e., estimate is accurate only at a specific value of another variable) and cannot be meaningfully interpreted. In summary, the results of the multilevel moderated regression provide support for the moderating effect of coping type (i.e., positive vs. negative) on the relationship between daily religious coping and negative affect.

Figure 4

Moderating Effect of Coping Type Between Daily Religious Coping and Daily Negative Affect



Note. Simple slopes of daily religious coping represent predicted values of daily negative affect for 1 SD below the mean of coping type ratio, the mean of coping type ratio, and 1 SD above the mean of coping type ratio.

Stage 3. To assess whether daily religious coping (M_i) mediates the relationship between daily pain (X) and negative affect (Y), a multilevel mediation analysis was conducted using the hierarchical procedure presented by Baron and Kenny (1986). In step 1, negative affect (Y) was regressed on daily pain (X) in order to establish an effect that may be mediated. The resulting model was significant, $F(1,757.899) = 6.868, p = .009$. There was a significant direct effect of daily pain on negative affect, $b = .041$.

The second step, regressing daily religious coping (M_i) on daily pain (X), was conducted using logistic multilevel modeling in Stage 1. The logistic model failed to establish daily pain as a significant predictor of daily religious coping, $F(1, 681) = .090, p = .764$. Per Baron & Kenny (1986), failing to establish a lower-level direct effect of predictor X to mediator M_i violates one

of the assumptions of using regression analysis to estimate a mediational model. In the interest of fully exploring the proposed moderated-mediation model, this violation was disregarded, and the final step of mediation analysis was conducted. The validity of its contribution to the larger model will be treated in discussion.

In the final step, negative affect (Y) was regressed on both daily pain (X) and daily religious coping (M_i) simultaneously so that a mediating effect on the outcome variable may be determined. The full model yielded neither daily pain ($b = .027, SE = .018$) nor religious coping ($b = .014, SE = .031$) as significant predictors of negative affect.

Stage 4. Lastly, the interaction term (M_iV) of daily religious coping (M_i) x coping type (V) supported as a moderator in Stage 2 was stepped into the analysis. See Table 4 for estimated regression weights and significance values in the resulting model.

When combined with daily pain and daily religious coping, the moderator (M_iV) remained a significant predictor of negative affect, $b = -.094, SE = .044, p = .031$. In the presence of a significant interactive term, predictive utilities of daily religious coping (M_i) and coping type (V) are considered conditional and thus not interpreted. Daily pain (X) did not demonstrate a significant predictive effect on negative affect. This interaction effect (M_iV) remained significant ($b = -.843, SE = .043, p = .049$) even after including disability ($b = .296, SE = .052, p = .000$) and race ($b = .032, SE = .071, p = .657$) as covariates in the model.

Table 4*Regression Analysis of Combined Moderated-Mediation Model*

Predictor	<i>b</i>	<i>SE</i>	<i>df</i>	<i>t</i>	Sig.	95% CI	
						<i>LB</i>	<i>UB</i>
Intercept	1.24	.136	156.966	9.127	.000	.971	1.507
Daily pain (X)	.025	.018	674.764	1.418	.157	-.01	.059
Daily religious coping (M _i)	.258	.116	681.934	2.228	.026	.031	.485
Coping Type (V) ^a	-.022	.052	146.047	-.429	.668	-.125	.08
Daily religious coping x coping type (M _i V)	-.094	.044	681.779	-2.157	.031	-.18	-.008

Note. CI = confidence interval; *LB* = lower bound; *UB* = upper bound

^a Ratio of mean PRC to NRC subscale scores.

In summary, a series of analyses were used to individually test each leg of the proposed moderated-mediation model. Stage 1 did not yield support for the hypothesized moderating effect of Brief RCOPE scores on the relationship between daily pain and religious coping ("B", Figure 1). Stage 2 did support the hypothesized moderating effect of the type of religious coping (i.e., positive vs. negative) on the relationship between daily religious coping and negative affect ("C", Figure 1). Stage 3 did not yield support for the hypothesis that daily religious coping would function as a mediator of the relationship between daily pain and negative affect ("A", Figure 1). The entirety of the model was tested in Stage 4 by stepping the significant stage 2 moderation term into the final statistical model of Stage 3. This procedure yielded support for only one leg of the proposed moderated-mediation model, the moderating effect of coping type (V) on the relationship between daily religious coping (M_i) and negative affect (Y).

DISCUSSION

The purpose of this study was to examine racial and gender differences in religious coping and to explore the interrelations of pain, religious coping, and negative affect in the daily experience of osteoarthritis. Consistent with prior research (e.g., Bearon & Koenig, 1990; Ferraro & Koch, 1994; Jones et al., 2008) African Americans (AAs) reported more frequent use of religious coping at the global level of measurement. These racial differences in Brief RCOPE scores remained significant when controlling for age, education, and marital status. Racial differences did not emerge, however, at the daily level. The current study also failed to yield any significant sex differences in religious coping behaviors at either level of measurement.

Contrary to previous research (e.g., Conway, 1986; Ferraro & Koch, 1994; Jones et al., 2008), demographic characteristics (sex, race) of the current sample did not reliably predict religious coping across levels. Lack of predictive utility remained even after controlling for site differences, as independent examination of each geographic subsample (New York, Alabama) yielded the same demographic effects as the combined group. Emergence of any gender differences in religious coping may have been hampered by the predominantly female sample (87.76%). This imbalance, however, is not uncommon in arthritis research due to the higher prevalence of OA in women (Buckwalter et al., 2004; Dominick & Baker, 2004; Srikanth et al., 2005). Predictive power of demographic variables was further limited by the relative over-representation of African American women ($n = 58$) who make up half of the total sample. Comparatively small subsamples of White ($n = 10$) and African American ($n = 10$) men may

have lacked sufficient power to yield the gender effects replicated elsewhere in the literature (e.g., Ellison & Taylor, 1996; Ferraro & Koch, 1994; Sattler & Kaiser, 1994).

Interrelations between participant demographics and variables of interest were also explored. Global pain severity reported in baseline interview was significantly associated with average pain levels reported throughout the week. Higher global pain was also related to greater endorsement of religious coping behaviors at both the global and daily levels of measurement. Similarly, participants with more intense pain throughout the week reported more frequent use of religious coping on a day to day basis. Negative affect demonstrated positive correlations with average daily pain reports, PGC Pain Scale scores, disability, and endorsement of negative religious coping strategies. Across participants, there were significant cross-level associations between variables reflecting negative experiences. Of these, disability status yielded particularly strong correlation coefficients with all the variables of interest. For the purposes of the current study, these associations were controlled with the inclusion of disability as a covariate. A more comprehensive exploration of these interactions, however, is recommended as an area for future research.

Stepwise exploration of the proposed moderated mediation model failed to support the hypothesized relationships among daily pain, religious coping, negative affect, and Brief RCOPE scores. Results indicated that only one leg of the model functioned as predicted, the moderating effect of the type of religious coping (positive vs. negative) on the relationship between daily religious coping and negative affect. Individuals who endorsed larger proportions of negative religious coping behaviors (e.g., "Wondered what I did for God to punish me") reported greater negative affect, but only on days when they employed religious coping strategies. This finding is meaningful as it expounds upon the sample-level correlation between higher NRC subscale

scores and negative affect. The significant interaction suggests that negative coping is an active part of one's daily experience, as opposed to a passive extension of trait negativity reflected in overall response style. What this finding does not reveal, however, is the temporal direction of this within-day association. Whether negative affect represents a byproduct of religious coping or a stimulus for its employment remains unclear.

In part, this interpretive limitation is imposed by the design of the current study. Because religious coping was only assessed during the last call of the day, multiple within-day data points for affect and pain were averaged to yield comparable day-level values. This condensation may potentially obscure the highs and lows that characterize one's daily pain experience. Compression of within-day variation is acknowledged as a limitation to the current analysis and should be taken into account when considering the significance of the results.

A significant point of discussion is the invariance that emerged across analyses with regard to daily pain, negative affect, and religious coping. Nearly a fifth of the sample ($n = 20$) reported the same amount of negative affect in each call over the entire week. In all cases, the repeated value of negative affect reported was none. Unvarying response patterns also emerged in reports of momentary pain across calls, though to a lesser extent ($n = 5$). Daily religious coping yielded the largest proportion of invariance, with the majority of participants (63.8%) implementing religious strategies either every day ($n = 37$), or not at all ($n = 37$) over the course of the week. This bimodal structure is unique to the daily level of measurement, as the normal distribution of Brief RCOPE scores suggested a range of religious coping use.

This lack of variability in daily (level-1) measures greatly diminished the proportion of unaccounted variance that could be explained by the moderated-mediation model. Procedurally, the fixed effects of invariant variables cannot be estimated, and the statistical program partials

them out of the analysis. The resulting lack of within-person variability is statistically represented by the high intraclass correlation (ICC) of .92 computed from the null model. Inversely, a strength of the present study is that the high proportion of between-person variability yielded greater predictive value to level-2 factors (e.g., demographics, Brief RCOPE scores).

Because data points for the current analysis were pulled from a significantly larger project, the finalized dataset was explored for potential sources of sampling bias. Data origin (T1 vs. T2) was examined as a potential covariate in preliminary analysis and found to be a significant predictor of scores on the PGC Pain Scale, $F(1, 114) = 103.175, p = .000$. This is not considered to be a meaningful association, as it is not reflected in the larger parent dataset (Parmelee & Smith, 2012-2019). Site differences (Alabama, New York) were also examined and found to be significantly correlated with variables of interest (pain, religious coping, and affect). Although outside the scope of the current analysis, geographical differences in pain and coping is an area that merits future exploration in this sample.

An additional limitation to the study's use of pre-existing data is the inability to develop measures that inform the research question. Rather, the current study design was formulated around the variables available, and results should be interpreted accordingly. Daily religious coping, for example, was measured by coding yes/no to the question "Did you pray, meditate, or turn to spirituality as a means of coping with your pain today?" The item was developed in the context of the parent study, in which ESM procedures were designed to capture experiences across domains with minimal imposition on participants. To that aim, however, the question fails to differentiate between types of coping behavior (e.g., prayer directed toward religious entity vs. mindfulness-based meditation) that may yield distinct relationships with an individual's daily

experience. Single item prompts, or arguably any quantitative measurement, are inherently not able to capture the complexity of an individual's unique religious coping experience.

To augment the limited utility of the ESM item, the current study used an extrapolation of each participant's Brief RCOPE scores to estimate the likelihood of employing positive vs. negative coping strategies on a daily basis. The reliability of this compensatory approach, however, is called into question by the differential effect of race demonstrated across levels of daily religious coping. Significant racial differences emerging in global measurement of religious coping but not reflected in the frequency of daily behaviors could similarly result in the estimated likelihoods of positive vs. negative coping strategies being less accurate for African American participants.

IMPLICATIONS

Results from this study will contribute to a body of research evaluating the role of religious coping in dealing with stress, particularly the stress of chronic pain. With rising concerns related to the addictive potentiality of prescription opioids (CDC, 2012; Wilson et al., 2020), any emerging studies pointing to nonpharmacological ways of coping with pain should be considered worthwhile avenues of further scientific exploration (Majeed et al., 2019).

Understanding more about how individuals use their religious beliefs to cope with pain could contribute to the formulation of more targeted therapies for religious individuals suffering from chronic illness. Progress in this direction, however, would require overcoming a longstanding division between the provision of clinical care and matters of spiritual faith. Pargament (2001) refers to "psychology's historical neglect of the religious dimension" as driving factor in the underestimation of religion as an effectual part of the coping process (p. 312). Religious coping is unique in that it occupies the intersection between components of the human experience with opposing accessibility for clinical intervention. Coping strategies offer a promising target for invention, while challenging a client's spiritual practice fringes upon the boundaries of ethical practice. There are, however, veins of progress being made toward reconciling these differences (Barnett & Johnson, 2011; Brown et al., 2013).

Implications of the current findings for the potential efficacy of religion in psychotherapeutic practice are mixed. Results indicate that in the current sample, employment of religious coping did not vary with daily fluctuations in pain or affect. For the majority of the sample, religious coping appeared to function more like a habit than a coping response—

something that one does or does not do every day. Because of the lack of variability, it cannot be determined whether this habitual practice improves or worsens one's daily experiences.

Potentially the most significant contributions of this study are the methodological barriers it encountered and how they may be used to inform the design of later work in this area. Based on the limited utility of a day-level, dichotomous religious coping item, future research endeavors would likely benefit from the incorporation of more comprehensive, multiple-item prompts or qualitative methods using a within-day sampling methodology. Similar methods could be used to capture a wider range of affective outcome, particularly for participants prone to invariable reporting.

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APPENDIX A

Brief RCOPE Questionnaire

The following items deal with how you have recently dealt with stressful life situations. This questionnaire focuses on the coping strategies that are spiritual or religious in nature. Using the following response choices, please rate how much or how frequently you did what the item says:

1 = Not at all 2 = Somewhat 3 = Quite a bit 4 = A great deal

1. Looked for a stronger connection with God. _____
2. Sought God's love and care. _____
3. Sought help from God in letting go of my anger. _____
4. Tried to put my plans into action together with God. _____
5. Tried to see how God might be trying to strengthen me in this situation. _____
6. Asked forgiveness for my sins. _____
7. Focused on religion to stop worrying about my problems. _____
8. Wondered whether God had abandoned me. _____
9. Felt punished by God for my lack of devotion. _____
10. Wondered what I did for God to punish me. _____
11. Questioned God's love for me. _____
12. Wondered whether my church had abandoned me. _____
13. Decided the devil made this happen. _____
14. Questioned the power of God. _____

APPENDIX B

IRB Approval



May 2, 2016

Patricia A. Parmelee, Ph.D.
Director, Alabama Research Institute on Aging
Professor, Department of Psychology
College of Arts & Sciences
The University of Alabama
Box 870315

Re: IRB # 11-OR-236-ME-R5 "Everyday Quality of Life in Osteoarthritis"

Dear Dr. Parmelee:

The University of Alabama Institutional Review Board has granted approval for your renewal application.

Your renewal application has been given expedited approval according to 45 CFR part 46. You have been granted the requested waiver of patient authorization to use PHI for recruitment or screening. Approval has been given under expedited review category 7 as outlined below:

(7) Research on individual or group characteristics or behavior (including, but not limited to, research on perception, cognition, motivation, identity, language, communication, cultural beliefs or practices, and social behavior) or research employing survey, interview, oral history, focus group, program evaluation, human factors evaluation, or quality assurance methodologies.

Your application will expire on May 1, 2017. If your research will continue beyond this date, complete the relevant portions of the IRB Renewal Application. If you wish to modify the application, complete the Modification of an Approved Protocol Form. Changes in this study cannot be initiated without IRB approval, except when necessary to eliminate apparent immediate hazards to participants. When the study closes, complete the appropriate portions of the IRB Study Closure Form.

Please use reproductions of the IRB approved informed consent form to obtain consent from your participants.

Should you need to submit any further correspondence regarding this proposal, please include the above application number.

Good luck with your research.

Sincerely,



Stuart Usdan, PhD.
Chair, Non-Medical Institutional Review Board
The University of Alabama