

# Psychometric Testing of the Daily Spiritual Experiences Scale Among African Americans in the Jackson Heart Study

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Published online: 20 August 2009  
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**Abstract** This study provided the first examination of the psychometric properties of the 6-item Daily Spiritual Experiences Scale (DSES) in a large African American sample, the Jackson Heart Study (JHS). The JHS included measures of spiritual (DSES) and religious practices. Internal reliability, dimensionality, fit indices, and correlation were assessed. DSES scores reflected frequent daily spiritual experiences ( $12.84 \pm 4.72$ ) and reliability scores were high ( $\alpha = 0.85$ ; 95% CI 0.84–0.86). The DSES loaded on a single factor, with significant goodness-of-fit scores (RMSEA = 0.094,  $P < 0.01$ ). Moderate significant

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correlations were noted among DSES items. Our findings confirm that the 6-item DSES had excellent psychometric properties in this sample.

**Keywords** Daily Spiritual Experiences Scale · Spirituality · Psychometrics · African American · Jackson Heart Study

## Introduction

Health disparities among African Americans have been well-documented (U.S. Department of Health and Human Services 2009). Identifying and examining factors that may aid in reducing or eliminating disparities is a national priority (U.S. Department of Health and Human Services 2000). Spirituality and religion are hypothesized as buffers for negative health outcomes, particularly among African Americans. Higher levels of spirituality and religion have been associated with numerous positive physiologic, psychosocial, and mental health outcomes, and have been conceptualized to have protective properties among their attributes (Koenig et al. 2001; Powell et al. 2003). The lack of a standard for assessing spirituality and religion has been a limitation of this work. For many studies, spirituality and religion have not been conceptually differentiated (Koenig et al. 2001). Conceptually grounded and psychometrically sound measures are needed to advance our understanding of how these factors influence health outcomes, particularly among high-risk populations including African Americans (Hill and Pargament 2003). Spiritual and religious influences are hypothesized to differentially affect health outcomes in this group (Levin et al. 2005; Lincoln and Mamiya 1990; Livingston et al. 1991; Lewis and Taylor 2009) further substantiating the need for well-validated instruments.

The Daily Spiritual Experiences Scale (DSES), a 16-item measure of ordinary daily spiritual experiences, was developed by Underwood as part of a multidimensional measure of spirituality and religion (Fetzer Institute 1999). A shortened 6-item version was developed for use in the General Social Survey (1998, 2004). Both versions of the DSES have shown promising results in psychometric testing with predominantly white populations (Ellison and Fan 2008; Maselko and Kubzansky 2006; Underwood and Teresi 2002).

DSES Cronbach's alpha ( $\alpha$ ) levels have been high, ranging from 0.94 to 0.96 for the total scale (Ellison and Fan 2008; Underwood and Teresi 2002). Specifically theistic and non-theistic items included in both versions have led some researchers to separate the DSES into two subscales. High Cronbach's  $\alpha$  have been found for the theistic and non-theistic items within both the 6- and 16-item scales (0.95, 0.90, respectively) (Ellison and Fan 2008). Factor analyses using the 16-item scale demonstrated a single factor structure—spirituality (Ellison and Fan 2008; Underwood and Teresi 2002), confirming the original intent of the instrument (Underwood 2008). Some sex and racial differences have been noted. Loustalot et al. (2006) demonstrated a similar single-factor structure and adequate content and construct validity, stability, internal consistency, and equivalence of the 6- and 16-item versions over time with a small African American sample. Researchers have noted more frequent DSES among African Americans compared to other racial/ethnic groups in small samples (McCauley et al. 2008). Additional evaluation is needed in larger African American populations to further ground this instrument and identify discernable trends among subpopulations.

The Jackson Heart Study (JHS), a cohort study of the risk factors and causes of cardiovascular disease in a large, all-African American population provided a unique opportunity to examine the psychometric properties of the DSES and associated measures

of religion and religious coping. This paper reports the reliability, confirms the dimensions, and assesses the discriminant validity of the DSES in the JHS cohort.

## Methods

The JHS is an all-African American, single-site prospective, longitudinal cohort study of cardiovascular disease conducted in 5,302 community-dwelling men and women residing in the Jackson, Mississippi Metropolitan Statistical Area. Participant recruitment and baseline examination were completed between September 2000 and March 2004 (Taylor et al. 2005; Fuqua et al. 2005). The study was approved by the Institutional Review Boards of the participating institutions: the University of Mississippi Medical Center, Jackson State University, and Tougaloo College. All participants provided informed consent.

Details of the study design and data collection have been reported elsewhere (Taylor et al. 2005; Payne et al. 2005; Carpenter et al. 2004). The religious and spiritual questionnaires of the JHS were provided to the participants at the conclusion of the home induction interview as part of a larger, self-administered questionnaire. The measures consisted of six spiritual items, which comprised the DSES, and three individual religious items [organized religion (OR), non-organized religion (NOR), and religious coping (RC)]. Trained interviewers instructed participants to answer the questions at their leisure, and return the completed booklet to the JHS Exam Center on or near the time of the initial clinic exam. Data were transferred from the paper forms into the JHS Clintrial<sup>®</sup> data management system by trained staff; a double data entry procedure assured quality control. All participants who returned the completed religious and spiritual measures were included in the data analysis ( $n = 3,985$ ), and those included in this study had comparable demographic characteristics to the overall JHS population (Fuqua et al. 2005).

### Measurement of Spiritual Experiences

Spiritual experiences were measured using the DSES. The DSES has been described as a measure of ‘mundane’ or ordinary daily spiritual experiences defined as the “...individual’s perception of the transcendent (God, the divine) in daily life and the perception of interaction with, or involvement of, the transcendent in daily life” (Fetzer Institute 1999, p. 11). The goal was to assess “the experiential and emotional...feelings and sensations [of daily life]...rather than cognitive awareness of specific beliefs” (Underwood 2006, p. 186). Underwood and Teresi (2002) and Underwood (2006) developed specific items from findings of detailed qualitative research. An introductory statement endorsed consideration of either God or another appropriate indication of the holy or divine in keeping with the participant’s belief system.

The JHS used the 6-item version of the DSES (Table 1). Participants were requested to indicate how often they experienced each item using a 6-point Likert-type scale (1 = many times a day, 2 = every day, 3 = most days, 4 = some days, 5 = once in a while, 6 = never). A total DSES score was calculated by adding individual item responses with a possible range of 6–36. Total DSES scores were further categorized into tertiles based on the distribution of responses [high (6–10), medium (11–14), and low (15–36)]. A total theistic DSES score was calculated by adding individual item responses for the three theistic items (feel God’s presence, desire closer union with God, feel God’s love) with a range of 3–18. Similarly, a total non-theistic DSES score was calculated by adding the non-theistic items (feel strength, feel deep inner peace, spiritually touched by creation). Lower scores on the total, theistic, and non-theistic DSES represented more reported daily spiritual experiences.

**Table 1** Percentage of religious practices and Daily Spiritual Experiences by age and sex in the Jackson Heart Study baseline exam

Variable	N	Age				P value	Sex		P value
		21–34	35–44	45–64	65+		Women	Men	
Total	3,985	182	797	2104	902		2,551	1,434	
Organized religion (%)									
Nearly everyday	28.9	17.0	26.3	28.5	34.7	<0.01	32.5	22.7	<0.01
At least once a week	50.9	43.4	47.4	51.2	54.8		52.2	48.5	
A few times a month	13.4	23.6	18.1	13.3	7.5		11.2	17.4	
A few times a year	4.5	12.1	5.9	4.6	1.7		3.0	7.3	
Less than once a year	1.2	1.6	1.6	1.1	0.7		0.7	2.0	
Not at all	1.1	2.2	0.6	1.3	0.7		0.4	2.2	
Non-organized religion									
More than once a day	56.1	44.0	52.9	54.5	63.4	<0.01	63.3	43.3	<0.01
Once a day	25.4	28.0	25.1	25.7	24.3		23.1	29.4	
A few times a week	11.0	17.6	13.0	11.6	6.5		8.9	14.9	
Once a week	2.1	2.7	2.4	2.3	1.3		1.5	3.3	
A few times a month	2.9	3.8	4.1	2.9	1.9		2.2	4.3	
Once a month	0.5	1.6	1.1	0.3	0.3		0.4	0.8	
Less than once a month	1.2	1.1	0.8	1.5	0.8		0.5	2.4	
Never	0.8	1.1	0.5	0.8	0.9		0.3	1.6	
Religious coping									
Very involved	64.8	53.3	59.5	65.8	69.5	<0.01	68.2	58.8	<0.01
Somewhat involved	29.5	36.8	34.4	28.4	26.1		27.6	32.8	
Not very involved	4.1	8.8	4.1	4.1	2.9		3.1	6.0	
Not involved at all	1.6	1.1	1.5	1.7	1.6		1.1	2.4	
Daily spiritual experiences									
High (6–10)	30.7	26.4	28.7	30.8	33.1	<0.01	34.3	24.2	<0.01
Medium (11–14)	40.6	31.3	38.1	40.8	44.0		40.8	40.1	
Low (15–36)	28.8	42.3	33.1	28.5	22.8		24.9	35.7	

## Measurement of Religious Practices

### *Organizational and Non-Organizational Religion*

Two measures were included to assess religious practices within or emanating from a formal religious setting (church, mosque, synagogue, or temple) (OR), and those more private activities that occur outside the confines of that organization (NOR). These items were selected from the Fetzer Multidimensional Measurement of Religiousness/Spirituality compilation of instruments assessing religious and spiritual constructs (Fetzer Institute 1999). Limited information on their psychometric properties is available, however, these items have been used extensively in previous research to assess OR and NOR (Hill and Hood 1999; Koenig et al. 2001). Church-related activity or OR (Koenig et al. 2001), was assessed by the statement: “In general, how often do you attend the main worship service of your church or otherwise participate in organizational religion (such as watching

services on TV, listening to services on the radio, participating in Bible study groups, etc.)?” Respondents were requested to indicate the extent of this practice with a 6-point Likert-type scale, which was later subdivided into 3 categories: (1) high (1 = nearly every day, 2 = at least once a week), (2) medium (3 = a few times a month, 4 = a few times a year), and (3) low (5 = less than once a year, 6 = not at all). Private religious practices or NOR (Koenig et al. 2001; Plante and Sherman 2001), were assessed by the statement: “Within your religious or spiritual tradition, how often do you pray privately or meditate in places other than at church, mosque, temple, or synagogue?” Respondents were requested to indicate the extent of this practice with a 8-point Likert-type scale, which was later subdivided into 3 categories: (1) high (1 = more than once a day, 2 = once a day), (2) medium (3 = a few times a week, 4 = once a week, 5 = a few times a month), and (3) low (6 = once a month, 7 = less than once a month, 8 = never).

### *Religious Coping*

Religious coping, the use of religious beliefs or practices in adapting to difficult life situations and stressful events (Koenig et al. 2001), was assessed by the item: “To what extent is your religion or spiritual tradition involved in understanding or dealing with stressful situations in any way?” The item was adapted from the RCOPE (i.e., religious coping) instrument developed by Pargament et al. (2000). The complete RCOPE contained an extensive list of positive and negative religious coping practices, with acceptable psychometric properties ( $\alpha > 0.80$ ) (Pargament et al. 2000). In the JHS, a single item from the RCOPE was used based on content and face validity, and consideration of participant burden. Respondents were requested to indicate the extent of this practice with a 4-point Likert-type scale, which was later subdivided into 3 categories: (1) high (1 = very involved), (2) medium (2 = somewhat involved), and (3) low (3 = not very involved, 4 = not involved at all).

### *Data Analysis*

Data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 15 (Statistical Package for the Social Sciences 2006). Participant characteristics, religious practices, and spiritual experiences were described using means and percentages. Associations among demographic characteristics (age, sex) and outcome measures were determined using Chi-square ( $\chi^2$ ). Cronbach’s  $\alpha$  coefficients were used to assess internal reliability, the extent to which the construct was accurately measured, first with the DSES alone and then including all the religious measures to determine reliability and correlation. Maximum likelihood factor analysis (MLFA), a method similar to confirmatory factor analysis, was conducted on the 6-item DSES and other religious measures to present a confirmatory factor model for the entire measure. The three religious variables (OR, NOR, RC) were secondarily added to the factor model. A supplemental analysis was conducted using exploratory principal components analysis (PCA) with a varimax rotation with the entire factor model to determine fit and to establish the factors produced in the MLFA (data not shown). Fit indices, including Chi-square significance tests and Root Mean Square Error of Approximation (RMSEA) were explored with the DSES and religious measures. Lastly, the discriminant validity, or degree of correlation among the items, of the DSES was assessed with Pearson’s correlations.

## Results

Table 1 depicts the sample characteristics and distribution of religious practices and spiritual experiences by age and sex. The mean age of the sample was  $54.37 \pm 12.57$  and 64.0% were women ( $n = 3,985$ ), which is reflective of the overall JHS cohort (Fuqua et al. 2005). Spiritual experiences and religious practices were high for men and women and all age ranges ( $P < 0.01$ ). Increasing age and female sex were associated with more participation in DSES, OR, NOR, and RC ( $P < 0.01$ ).

Individual item, subscale, and total mean DSES scores were reported by age and sex in Table 2. For individual items, the theistic item 4 (“I desire to be closer to or in union with God”) had the lowest mean score ( $1.86 \pm 0.84$ ) while the non-theistic item 3 (“I feel deep inner peace and harmony”) had the highest ( $2.60 \pm 1.13$ ). Women and older participants reported lower DSES theistic scores compared to non-theistic scores (data not shown). The total mean DSES score was low, reflecting more frequent DSES, and was lower for women than men.

Table 3 depicts findings from analyses of internal reliability. Cronbach’s  $\alpha$  was high for all DSES items ( $\alpha = 0.85$ ; 95% CI 0.84–0.86) and acceptable (Nelson et al. 2001) for the theistic ( $\alpha = 0.73$ ) and non-theistic ( $\alpha = 0.76$ ) items. Alpha levels and correlations among variables were relatively low among other religious and spiritual measures. However, the correlations between religious and spiritual variables consistently reached statistical significance ( $P < 0.01$ ).

The 6-item DSES loaded on one factor (daily spirituality) with scores ranging from 0.620 to 0.817 (Table 4). After OR, NOR, and RC were added to the factor model, a second factor (religiosity) loaded (0.150–0.474) (Table 5). Supplemental PCA with varimax rotation further segregated the two factors with OR, NOR, and RC loading consistently on the second religiosity factor (data not shown).

Table 6 depicts the goodness-of-fit indices for the JHS religious practices and spiritual experiences measures. The highly significant Chi-square ( $\chi^2 = 300.431$ ,  $P < 0.01$ ) and RMSEA (0.094) of the DSES denoted a good fit among the 6-items. The Chi-square

**Table 2** Individual, subscale, and total Daily Spiritual Experiences Scale scores by sex, Jackson Heart Study baseline exam ( $n = 3,985$ )

	Women Mean (SD)	Men Mean (SD)	Total Mean (SD)
DSES item			
1. I feel God’s presence	2.16 (1.14)	2.45 (1.29)	2.26 (1.21)
2. I feel strength and comfort in my religion or spiritual tradition	2.04 (0.96)	2.31 (1.12)	2.13 (1.03)
3. I feel deep inner peace and harmony	2.55 (1.11)	2.69 (1.17)	2.60 (1.13)
4. I desire to be closer to or in union with God	1.76 (0.75)	2.05 (0.95)	1.86 (0.84)
5. I feel God’s love for me, directly, or through others	1.89 (0.92)	2.13 (1.06)	1.98 (0.98)
6. I am spiritually touched by the beauty of creation	1.91 (0.96)	2.15 (1.11)	2.00 (1.02)
DSES subscales			
Theistic subscale (Items 1, 4, 5)	4.56 (1.75)	5.20 (2.21)	4.79 (1.95)
Non-theistic subscale (Items 2, 3, 6)	5.23 (2.03)	5.72 (2.29)	5.40 (2.14)
DSES total score	12.32 (4.30)	13.78 (5.27)	12.84 (4.72)

**Table 3** Internal reliability: Daily Spiritual Experiences, organized religion, nonorganized religion, religious coping, Jackson Heart Study baseline exam ( $n = 3,985$ )

	Cronbach's alpha	Standardized Cronbach's alpha	95% confidence Intervals	Correlations
DSES	0.8510	0.8534	0.8437–0.8580	NA
Theistic–Non-theistic*	0.8244	0.8265	0.8132–0.8350	0.704**
DSES–OR	0.2237	0.4959	0.1739–0.2704	0.330**
DSES–NOR	0.3591	0.6052	0.3180–0.3977	0.434**
DSES–RC	0.2145	0.6156	0.1641–0.2618	0.445**
NOR–OR	0.5542	0.5734	0.5256–0.5810	0.402**
RC–NOR	0.4270	0.5030	0.3903–0.4615	0.336**
RC–OR	0.4564	0.4800	0.4216–0.4892	0.316**

\* Cronbach's alpha = 0.73 (theistic subscale); 0.76 (Non-theistic subscale)

\*\*  $P < 0.01$

**Table 4** Maximum likelihood factor analysis: Daily Spiritual Experiences Scale, Jackson Heart Study baseline exam ( $n = 3,985$ )

Item #	Item	Factor loadings
DSES1	I feel God's presence	0.714
DSES2	I find strength and comfort in my religion and spiritual tradition	0.817
DSES3	I feel deep inner peace in harmony	0.710
DSES4	I desire to be closer to or in union with good	0.620
DSES5	I feel God's love for me, directly, or through others	0.726
DSES6	I am spiritual touched by the beauty of creation	0.625

**Table 5** Maximum likelihood factor analysis: Daily Spiritual Experiences Scale with organized religion, non-organized religion and religious coping, Jackson Heart Study baseline exam ( $n = 3,985$ )

Item #	Item	Factor 1	Factor 2
DSES1	I feel God's presence	0.702	–0.109
DSES2	I find strength and comfort in my religion and spiritual tradition	0.819	–9.119E-02
DSES3	I feel deep inner peace in harmony	0.700	–0.185
DSES4	I desire to be closer to or in union with good	0.632	6.629E-02
DSES5	I feel God's love for me, directly, or through others	0.707	–0.121
DSES6	I am spiritual touched by the beauty of creation	0.616	–0.101
OR	In general, how often do you attend the main worship service of your church or otherwise participate in organized religion?	0.422	0.386
NOR	Within your religious or spiritual tradition, how often do you pray privately or meditate in places other than at church, mosque, temple, synagogue?	0.534	0.474
RC	To what extent is your religious or spiritual tradition involved in understanding or dealing with stressful situations in any way?	0.513	0.150

Also performed principal component factor analysis (PCA) with varimax rotation with similar results. However, in the PCA analyses, the second factor loaded at a more consistent rate with OR, NOR, and RC

**Table 6** Goodness-of-fit indices: Daily Spiritual Experiences, organized religion, non-organized religion, and religious coping, Jackson Heart Study baseline exam ( $n = 3,985$ )

Measure/index	Test value	<i>P</i> value
DSES		
$\chi^2$	300.431 (df = 9)	<0.01
RMSEA	0.094	
OR, NOR, RC, and 6-item DSES		
$\chi^2$	448.672 (df = 19)	<0.01
RMSEA	0.079	

**Table 7** Discriminant validity (Pearson correlations) among Daily Spiritual Experience Scale items, Jackson Heart Study baseline exam ( $n = 3,985$ )

	DSES 1	DSES 2	DSES 3	DSES 4	DSES 5	DSES 6
DSES 1	1.000					
DSES 2	0.603*	1.000				
DSES 3	0.514*	0.624*	1.000			
DSES 4	0.427*	0.495*	0.376*	1.000		
DSES 5	0.516*	0.560*	0.485*	0.528*	1.000	
DSES 6	0.417*	0.484*	0.439*	0.412*	0.513*	1.000

\*  $P < 0.01$

remained statistically significant with the inclusion of all religious and spiritual variables ( $\chi^2 = 448.672$ ,  $P < 0.01$ ), while the RMSEA was lower (0.079).

Table 7 depicts the discriminant validity among the DSES items using Pearson's correlations. While each of the six items in the DSES was statistically significant ( $P < 0.01$ ), they maintained only moderately strong correlations (0.376–0.624).

## Discussion

This study was the first to explore the psychometric properties of the DSES and associated measures of OR, NOR, and RC in a large all-African American sample. Findings among JHS African Americans are comparable to those in other ethnic groups and provide evidence that the DSES and other measures of religion are reliable and valid for use in this population.

African Americans have traditionally reported high levels of religious practices and spiritual experience (Taylor et al. 2007; McCauley et al. 2008). Our study substantiated these findings for adult men and women across all ages. As noted in prior research (McCauley et al. 2008; Taylor et al. 2004; Underwood and Teresi 2002), women and older participants reported significantly higher levels of religious participation and spiritual experience. Nearly all JHS participants attended religious services at least weekly, participated in prayer or meditation once or more a day, and reported high involvement of religion in coping with daily stressors. The mean DSES score ( $12.84 \pm 4.72$ ) in JHS was slightly higher than our preliminary work in a similar population ( $11.30 \pm 3.43$ ) (Loustalot et al. 2006) but lower (indicating more frequent DSES) than reported among African American participants in the General Social Survey 1997–1998 ( $14.93 \pm 6.37$ ) (Underwood and Teresi 2002). As anticipated, DSES scores for JHS participants were much lower



than reported in previous assessments among whites ( $19.28 \pm 7.91$ ) (Underwood and Teresi 2002). The JHS was conducted in a geographic region characterized as the “Bible belt” where higher participation in religious practices and spiritual experiences compared with the rest of the US has been reported (Gallup and Lindsay 1999).

The reliability levels in the 6-item DSES were comparable to those reported in previous research in African Americans (Loustalot et al. 2006) and predominantly white populations (Davis et al. 2004, [General Social Survey],  $\alpha = 0.91$ ). Fit indices noted the goodness of fit among the DSES items. As expected, there was some degree of correlation among the DSES items. The degree of correlation was moderate ranging from 0.376 to 0.624 and was lower than the consistent 0.60–0.80 range reported with the 16-item DSES (Underwood and Teresi 2002). Higher correlations would indicate items measuring the same concept, and would therefore be redundant.

The 6-item DSES loaded on a single factor (daily spirituality) in the JHS, and previous research support these findings (Ellison and Fan 2008; Mofidi et al. 2006). Underwood and Teresi (2002) has reported a second factor loading on the 16-item DSES in previous research, but only two items loaded on the separate factor and the majority of the factor analyses “tended to be unidimensional” (p. 28). Subdividing the DSES into theistic and non-theistic subscales did not alter the factor analysis results, and the subscales maintained a high degree of correlation. Previous research has noted differing relationships with the theistic and non-theistic subscales. Ellison and Fan (2008) noted that the non-theistic subscale of the DSES was a better predictor of psychological well-being (e.g., happiness, excitement with life, self-esteem, and optimism), than was the non-theistic subscale. Underwood (2008) continues to recommend the use of the original 16-item DSES, and utilizing these theistic and non-theistic subscales for supplemental analyses may be beneficial for future research to assess unique influences within the DSES.

The addition of OR, NOR, and RC used in the JHS produced a second factor (religiosity), reflecting the conceptual separation of the religious and spiritual measures. Most JHS participants reported high levels of religious participation, in addition to high levels of spiritual practice. Principal components analysis with a varimax rotation provided further confirmation that the variables loaded on two separate factors. These findings support the use of separate religious and spiritual instruments in future research, as the health-protective properties of the constructs may differ.

This study was not without limitations. The JHS is a single-site study located in a southeastern metropolitan area and our promising findings cannot be generalized to African Americans in other regions of the country. Religious practices and spiritual experiences tend to be higher in the southern US, and that phenomenon was reflected in this study. The limited variability of the religious and spiritual responses also presented a limited distribution for comparison analyses. Final limitations were the usual biases introduced by self-report and cross-sectional data as well as the proportion of the JHS participants who did not return the completed instruments measuring spiritual experiences and religious practices and participation to the JHS clinic. While these participants had a similar demographic profile to those who completed the questionnaire, their responses may have altered the results. Despite these limitations, this psychometric assessment of the DSES within a large, all-African American cohort provided substantial confirmation for its use within this population and sets the stage for much-needed longitudinal research (Ellison and Fan 2008; Mofidi et al. 2006; Sims et al. 2009) within this and other African American cohorts.

This study furthers the growing body of literature supporting the use of the DSES in numerous populations and provides important evidence that measures of religion and spirituality, often referred to as interchangeable concepts, are clearly demarcated by the

JHS measures. To understand how religion and spirituality influence health outcomes, studies such as these are necessary to ground the field in psychometrically sound assessment tools.

**Acknowledgments** This research was supported by NIH contracts N01-HC-95170, N01-HC-95171, and N01-HC-95172 that were provided for the Jackson Heart Study by the National Heart, Lung, and Blood Institute and the National Center for Minority Health and Health Disparities, and an Ambassadorial Scholarship from Rotary International.

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