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Multidimensional Assessment of Spirituality/Religion in Patients with HIV: Conceptual Framework and Empirical Refinement

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Abstract

A decade ago, an expert panel developed a framework for measuring spirituality/religion in health research (Brief Multidimensional Measure of Religiousness/Spirituality), but empirical testing of this framework has been limited. The purpose of this study was to determine whether responses to items across multiple measures assessing spirituality/religion by 450 patients with HIV replicate this model. We hypothesized a six-factor model underlying a collective of 56 items, but results of confirmatory factor analyses suggested eight dimensions: Meaning/Peace, Tangible Connection to the Divine, Positive Religious Coping, Love/Appreciation, Negative Religious Coping, Positive Congregational Support, Negative Congregational Support, and Cultural Practices. This study corroborates parts of the factor structure underlying the Brief Multidimensional Measure of Religiousness/Spirituality and some recent refinements of the original framework.

Keywords

Spirituality; Religion; HIV; Brief Multidimensional Measure of Religiousness/Spirituality

Introduction

Spirituality and religion are complex phenomena that are being characterized and operationalized in the health literature (Hall et al. 2008; Idler et al. 2003). *Spirituality* is often defined as that which gives a transcendent meaning to life and may include the internal, personal, and emotional expression of the sacred. It is measured by assessing spiritual well-being, peace and comfort derived from faith, and spiritual coping. Spirituality can be distinguished from *religion* and *religiosity* (or *religiousness*)—the formal, institutional, and outward expression of the sacred, assessed by measuring importance of religion, belief in God, and frequency of religious attendance, prayer, or meditation (Koenig 2008b; Koenig et al. 2001; Miller and Thoresen 2003). *Spirituality/religion* is sometimes used as an umbrella term to denote the various dimensions of spirituality and religion/religiousness (Miller and Thoresen 2003).

An ongoing debate exists over how to best measure spirituality/religion in health research (Hall et al. 2008). To aid in developing a gold standard, a panel of experts identified critical components of spirituality/religion relevant to health outcomes and developed the Brief Multidimensional Measure of Religiousness/Spirituality (BMMRS) (Fetzer Institute and National Institute on Aging Working Group 1999). The conceptual framework of the BMMRS has been described elsewhere (Idler et al. 2003). Briefly, the measure limits the spirituality/religion dimensions to those thought to be related to health; distinguishes between religiousness and spirituality; and encompasses multiple factors (vs. a single scale). The BMMRS framework also considers that various health outcomes can be affected by spirituality/religion (positively or negatively), distinguishes several types of causal pathways from spirituality/religion to health (behavioral, social, psychological, and physiological), and acknowledges a cumulative effect of spirituality/religion across the life span (Idler et al. 2003). For example, religious teachings may promote healthier lifestyles and strengthen (or weaken) adherence to prescribed therapies. Also, religious groups represent social ties that may form a source of various types of support and buffer stress; support can also be denied or withdrawn (e.g., due to illness-specific stigma) causing stress. Based on those premises, the BMMRS captures 12 domains of spirituality/religion: *Daily Spiritual Experiences*, *Meaning*, *Values/Beliefs*, *Forgiveness*, *Private Religious Practices*, *Religious/Spiritual Coping*, *Religious Support*, *Religious/Spiritual History*, *Commitment*, *Organizational Religiousness*, *Religious Preference*, and *Overall Self-Ranking* as a religious/spiritual person (Fetzer Institute and National Institute on Aging Working Group 1999).

The literature reports high internal consistency reliabilities (Cronbach's alpha: 0.71 to 0.93) for each of the BMMRS subscales and strong overall construct validity (Harris et al. 2008; Kendler et al. 2003; Mokuau et al. 2003; Pargament 1999; Pargament et al. 2000; Underwood and Teresi 2002; Yoon and Lee 2007), but findings regarding the proposed theoretical factor structure of the BMMRS are inconclusive, with most validation studies having been conducted in healthy populations (Idler et al. 2003; Johnstone et al. 2009; Neff 2006; Piedmont et al. 2007; Stewart and Koeske 2006). Johnstone and colleagues (Johnstone et al. 2009) recently attempted to validate the BMMRS in a sample of patients with diverse medical conditions and identified six subdomains underlying eight BMMRS scales: *Positive Spiritual Experience* (e.g., "I find strength and comfort in my religion"), *Negative Spiritual Experience* (e.g., "I wonder if I have been abandoned by a higher power"), *Forgiveness* (e.g., "I know that I am forgiven by a higher power"), *Cultural Practices* (e.g., "How often do you go to religious services?"), *Positive Congregational Support* (e.g., "If you were ill, how much would the people in your congregation help you out?"), and *Negative Congregational Support* (e.g., "How often do the people in your congregation make too many demands on you?"). The study suggested "de-emphasizing the focus on 'religious'

versus ‘*spiritual*’ factors” (p. 155) and focusing on factors that have positive or negative effects on health. That model is yet to be replicated in other samples and populations.

As a comprehensive and theory-driven measure, the BMMRS is becoming the preferred measure of spirituality/religion in health research (Cotton et al. 2010; Koenig 2008a), but it has not been widely utilized in research on spirituality/religion in HIV/AIDS. Spirituality/religion is an important facet of quality of life for those facing chronic or life-threatening illness such as HIV/AIDS. In patients with HIV, higher levels of spirituality/religion have been associated with better immune function, survival, health-related quality of life, life satisfaction, treatment success, medication adherence, and overall well-being (Bormann et al. 2006; Braxton et al. 2007; Cotton et al. 2006; Dalmida 2006; Ironson and Kremer 2009; Ironson et al. 2002; Ironson, Stuetzle et al. 2006; Pargament et al. 2004; Szaflarski et al. 2006; Tsevat et al. 2009; Woods et al. 1999). People living with HIV incorporate spirituality/religion as a way to cope, to promote positive thinking, to help re-frame their life, and to bring a sense of meaning and purpose in the face of an often overwhelming situation (Ironson and Kremer 2009; Kremer and Ironson 2009; Ridge et al. 2008). However, religious involvement may also exacerbate negative thinking if linked with lifestyles or behaviors—such as homosexual relations or drug use—that violate religious norms and that are stigmatized within religious and ethnic circles (Ellison and Levin 1998; Ironson, Kremer et al. 2006; Pargament et al. 2004; Trevino et al. 2007).

Despite the mounting evidence of the importance of spirituality/religion in HIV-positive individuals, measurement of spirituality/religion in HIV has been highly variable and only partly consistent with the emerging standards such as multidimensionality. In particular, the use of the BMMRS has been limited to small/qualitative studies and selected items or subscales (Bernstein et al. 2009; Garber et al. 2007; Ironson and Kremer 2009; Tarakeshwar et al. 2006). Other research examining spirituality/religion in patients with HIV has focused on specific dimensions such as spirituality (Peterman et al. 2000) or religious coping (Trevino et al. 2007). Some studies have used multiple measures that attempt to tap different dimensions of spirituality/religion known to influence outcomes in patients with HIV (e.g., religiousness, spirituality, and religious coping) (Cotton et al. 2006). Unfortunately, there is little information about how such measures are conceptually and psychometrically interrelated—for instance, are they truly independent in terms of content or is there some overlap among them? It is also unclear to what extent those different measures taken together capture the multidimensional model of spirituality/religion reflected in the BMMRS, the conceptual “gold standard.” Further work is needed to confirm the extent to which other measures, which have been shown useful in studies of patients with HIV, overlap with the BMMRS and to provide guidance on how to use these measures. Therefore, the purpose of this study was to evaluate the measurement of spirituality/religion in patients with HIV by examining the factor structure underlying a battery of 56 spirituality/religion items in a sample of 450 HIV-positive patients. Following the BMMRS framework and recent literature, the measure of spirituality/religion in patients with HIV was hypothesized (1) to be multidimensional (have multiple factors vs. a single factor), (2) to reflect the distinction between spirituality and religion, and (3) to capture both positive and negative effects of spirituality/religion on health. Because evidence regarding the number of factors is mixed, our study attempted to replicate the most recent model proposed by Johnstone et al. (2009) by testing whether six factors—*Positive Spiritual Experience*, *Negative Spiritual Experience*, *Forgiveness*, *Cultural Practices*, *Positive Congregational Support*, and *Negative Congregational Support*—fit the data in patients with HIV. Finally, the study explored whether the multidimensional model of spirituality/religion has a higher-order factor structure.

Methods

Data

These analyses were conducted as a part of a larger study that examined the clinical, sociodemographic, and psychosocial determinants of the health-related quality of life (HRQOL) in patients with HIV/AIDS (Mrus et al. 2006). In 2002–2003, 450 outpatients were recruited from four clinics in three US cities. The institutional review boards at the participating institutions approved the study. Subjects gave written consent and were compensated \$30 for their time and travel. Data were collected through patient interviews using standardized assessments of HRQOL, depression, social support, spirituality/religion, health concerns, self-esteem, and risk attitude.

Spirituality/Religion Measures

Spirituality/religion was assessed by three self-report instruments that addressed the various dimensions identified as important in patients with HIV, such as public and private religious practices, spirituality, and religious coping. The first instrument was the Duke Religion Index (DUREL), a five-item measure assessing three domains of religiousness: *Organized Religious Activity* (“How often do you attend church, synagogue, or other religious meetings?”), *Non-organized Religious Activity* (“How often do you spend time in private religious activities, such as prayer, meditation, or Bible study?”), and *Intrinsic Religiosity* (“In my life, I experience the presence of the Divine [God]”; “My religious beliefs are what really lie behind my whole approach to life”; and “I try hard to carry my religion over into all other dealings in life.”) (Koenig et al. 1997). Responses ranged from 1 (“never”) to 6 (“more than once a week”) for the first two items and 1 (“definitely not true”) to 5 (“definitely true”) for the intrinsic religiosity items. The DUREL has been validated in community and clinical samples and appears to be strongly related to various health outcomes. The Cronbach’s alpha values ranging from 0.75 to 0.88 have been reported for the intrinsic religiosity subscale (Hill and Hood 1999; Koenig et al. 1997; Szaflarski et al. 2006).

The second instrument was the Functional Assessment of Chronic Illness Therapy-Spirituality-Expanded (FACIT-SpEx) scale, a 23-item measure that included eight items comprising a *Meaning/Peace* subscale (e.g., “I feel peaceful”), four items forming a *Faith* subscale (e.g., “I find strength in my faith or spiritual beliefs”), and additional items tapping connectedness, love, forgiveness, gratitude, hope, and appreciation (FACIT 2007). Respondents were asked to indicate how true each statement has been for them during the past 7 days, using a five-item Likert scale. The Cronbach’s alpha coefficients for the *Meaning/Peace* and *Faith* subscales and their combined 12-item scale ranged from 0.81 to 0.88 in prior studies (Peterman et al. 2002; Canada et al. 2008). The Cronbach’s alpha of 0.95 has been reported for the full 23-item scale (Szaflarski et al. 2006).

The third measure of spirituality/religion was the Brief RCOPE, a subscale developed from the full RCOPE scale, a comprehensive assessment of religious coping (Pargament et al. 2000). The subscale included 14 items that assessed positive and negative aspects of religious coping, referred to as *Positive Religious Coping* and *Negative Religious Coping* (e.g., “Looked for a stronger connection with God” vs. “Wondered whether God had abandoned me,” respectively). This study also included 13 additional items from the full RCOPE that assessed congregational discontent and spiritual/religious support (e.g., “Felt my church seemed to be rejecting or ignoring me” or “Looked for spiritual support from clergy”). Respondents were asked to indicate on a five-item Likert scale the extent to which they have done what the item stated since their HIV diagnosis. The Brief RCOPE has shown evidence of internal consistency and discriminant and criterion-related validity; past studies

reported factor loadings greater than 0.60 and 0.53 and Cronbach's alpha of 0.90 and 0.81 for the *Positive Religious Coping* and *Negative Religious Coping* subscales, respectively (Pargament 1999).

All three measures showed good reliability in our sample. The Cronbach's alpha were 0.88, 0.95, 0.92, and 0.82 for the DUREL intrinsic religiosity subscale, the FACIT-SpEx, and the Positive and Negative RCOPE subscales, respectively (Szaflarski et al. 2006).

Analysis

The study tested the following hypotheses: (1) There is no single factor underlying the model of spirituality/religion items in the HIV-positive sample (per the BMMRS conceptual framework); (2) Six factors—*Positive Spiritual Experience*, *Negative Spiritual Experience*, *Forgiveness*, *Cultural Practices*, *Positive Congregational Support*, and *Negative Congregational Support*—underlie the model of spirituality/religion (per Johnstone and colleagues); (3) There is no higher-order factor underlying the model of spirituality/religion (assumed but not tested in the literature); and (4) The distinction between *positive* and *negative* factors is more pronounced than between *spiritual* and *religious* factors (per Johnstone and colleagues). Furthermore, the analyses tested additional hypotheses in an attempt to refine the measure.

The analysis consisted of two steps:

- Step 1** A hypothesized factor model of spirituality/religion was derived from the existing literature. Specifically, the items from the DUREL, the FACIT-SpEx, and the Brief RCOPE scales were compared with the BMMRS items that fit the six domains proposed by Johnstone et al. (2009). Each item was examined and assigned to a specific domain based on face validity.
- Step 2** Confirmatory factor analysis (CFA) was used to determine whether specific plausible factor structures fit the item data. Throughout, the analysis was based on unidimensional factors and reflective measurement models (see Technical Appendix) and included testing single- and multiple-factor conceptualizations (Hypotheses 1 and 2) and, among multiple-factor models, correlated first-order factors and a higher-order factor (Hypothesis 3). Model refinement proceeded using a “grounded theory” approach: the analysis evolved based on initial results, with Hypotheses 3–4 and any new hypotheses being tested (or further tested) in a less formally predetermined fashion, but using the same factor analytic procedure.

The CFA analysis proceeded by first running the model with a sample size of 200 to generate the chi-square statistic reflecting the difference in the inputted covariance matrix and the matrix derived from the best fit loadings with minimum distortion due to sample size. Then, the model was rerun on the full sample to test the statistical significance of individual parameters. Indicators of a good model fit were a small chi-square value with a correspondingly larger *P* value (exceeding 0.05); large goodness-of-fit index (GFI) and adjusted goodness-of-fit index (AGFI) values—the closer these values were to 1.0, the better the fit (with a large number of variables, values greater than or equal to 0.8 were desired; fewer observed variables increased the acceptable thresholds); a small standardized root mean square residual (SRMR); and a Critical *N* value of 200 or greater. The study also followed the convention that an item would not be acceptable if it loaded on more than a single factor (see the Technical Appendix for additional details on the analysis and underlying assumptions). All analyses were conducted by using LISREL software, version 8.8 (Jöreskog and Sörbom, 2006) or SAS software, Version 9.1 (SAS Institute Inc., 2002–2003).

Results

Each of the 56 items from the DUREL, the FACIT-SpEx, and the RCOPE scale was assigned to one of the six hypothesized domains (Table 1). The CFA analysis followed to test Hypotheses 1–4 and refine the model.

Test of One-Factor and Six-Factor Confirmatory Models (Hypotheses 1 and 2)

First, the collective of items from the DUREL, the FACIT-SpEx, and the RCOPE scales were constrained to load on a single factor, spirituality/religion. All the measures of fit from this single-factor CFA model indicated a poor fit (chi-square = 12,421; df = 1,484; P < 0.001; GFI = 0.258). These results provided support for Hypothesis 1.

Next, the collective of observed variables was partitioned to load on the six hypothesized dimensions of spirituality/religion. This model was not corroborated in this form (chi-square = 8,283; df = 1,415; P < 0.001; GFI = 0.398), leading to the rejection of Hypothesis 2. Then, the analysis turned to refining the six-domain model.

The model was refined by performing separate single latent variable CFAs for *Positive Spiritual Experience*, *Negative Spiritual Experience*, *Positive Congregational Support*, and *Negative Congregational Support*. A two-factor CFA was run for *Forgiveness* and *Cultural Practices* due to the presence of only a few observed variables. The domain, *Positive Spiritual Experience*, had the most complex structure. A model (results not shown) loading the 32 observed variables on one underlying variable did not produce an acceptable fit. Among several refinement options, the most fruitful was an oblique common factor analysis (promax rotation), which suggested four groupings of the items. Then the four-factor CFA was run to further ascertain which items had loadings of sufficient magnitude to justify retaining them. The resultant four-factor model retained 12 items, and, importantly, four dimensions emerged in place of *Positive Spiritual Experience* (although there were at least two alternatives, see Discussion): *Meaning/Peace*, *Tangible Connection to the Divine*, *Positive Religious Coping*, and *Love/Appreciation* (Table 2). For example, three items loaded on *Tangible Connection to the Divine*: “I feel connected to a higher power (or God)” had a loading of 0.92—indicating that 85% of the variation ($= 0.92^2$) in the responses to this item was due to feelings of having a *Tangible Connection to the Divine*; “Trusted that God was with me” had a loading of 0.85 on *Tangible Connection to the Divine*; and “... I experience the presence of the Divine (God)” had a loading of 0.74 on *Tangible Connection to the Divine*. The model fit well (chi-square = 37.64, P = 0.859; GFI = 0.969).

The four dimensions were interrelated (Table 3). The strongest correlations were between *Tangible Connection to the Divine* and *Positive Coping* (0.82) and between *Meaning/Peace* and *Love/Appreciation* (0.80). The analysis proceeded to explore whether a single higher-order factor (*Positive Spiritual Experience*) covered these four dimensions (and experimented with alternative items), but did not find an acceptable fit (results not shown).

The model retained five of the eight items for *Negative Spiritual Experience* (Table 4, tier a) with good fit (chi-square = 4.72, P = 0.451; GFI = 0.991). *Negative Spiritual Experience* correlated at 0.79 with “Felt punished by God for my lack of devotion” and at 0.78 with “Wondered what I did for God to punish me.” These loadings indicate that *Negative Spiritual Experience* accounted for approximately 60% of the variation in responses to each of these items.

In a modified two-factor CFA relating *Forgiveness* and *Cultural Practices*, the model retained two of the three items hypothesized to load on *Forgiveness* and both items hypothesized to load on *Cultural Practices* (Table 4, tier b). This model fit well (chi-square =

0.08, $P = 0.783$; GFI = 1.000). *Forgiveness* correlated at 0.71 with “I am able to forgive others for any harm they have ever caused me” and at 0.69 with “I feel forgiven for any harm I may have ever caused.” These loadings indicate that *Forgiveness* accounted for about 50% of the variation in responses to each of these items. “How often do you attend church, synagogue, or other religious meetings?” loaded at 0.73 and “How often do you spend time in private religious activities, such as prayer, meditation, or Bible study?” loaded at 0.61 on *Cultural Practices*. *Forgiveness* and *Cultural Practices* correlated at 0.50, indicating that they share about 25% of their variance.

The resulting scale for *Positive Congregational Support* retained four of the five items (Table 4, tier c). The model fit was acceptable (chi-square = 3.6, $P = 0.168$; GFI = 0.991). “Looked for love and concern from the members of my church” and “Asked others to pray for me” loaded most heavily on *Positive Congregational Support*, with loadings of 0.95 and 0.94, respectively.

The trimmed scale for *Negative Congregational Support* retained four of the five items (Table 4, tier d). The model fit was good (chi-square = 1.78, $P = 0.410$; GFI = 0.996). “Felt dissatisfaction with the clergy” and “Felt my church seemed to be rejecting or ignoring me” loaded most heavily on *Negative Congregational Support*, with loadings of 0.95 and 0.88, respectively.

These results generated a new hypothesis (Hypothesis 2a): Nine factors underlie the model of spirituality/religion—*Meaning/Peace*, *Tangible Connection to the Divine*, *Positive Religious Coping*, *Love/Appreciation*, *Negative Spiritual Experience*, *Forgiveness*, *Cultural Practices*, *Positive Congregational Support*, and *Negative Congregational Support*. This hypothesis was tested next.

Test of a Nine-Factor Confirmatory Model (Hypothesis 2a and Hypotheses 3–4)

The analysis proceeded by joining the individually trimmed models into a nine-factor CFA, testing this reformulated model in two ways. First, this nine-factor model required that many more covariances among variables be fit and, thus, raised the standard of a good fit considerably and provided some construct validity. For example, the results for *Negative Congregational Support* (Table 4, tier d) required fit to six observed covariances. This same factor would have to fit those six covariances plus the covariances among each of the scale’s four items and every other item measuring the other eight factors ($4 \times 25 = 100$ more covariances). Second, the simultaneous fit of nine factors would establish discriminant validity of each latent variable as each is shown to “cause” related, but different, items (all measuring different dimensions).

This nine-factor model showed acceptable fit (chi-square = 364, $P = 0.188$; AGFI = 0.857; Table 5). The loadings were similar to those previously presented, with two exceptions: First, the loadings for the *Positive Congregational Support* items were more similar to each other in this model, and second, the loadings for three of the four *Negative Congregational Support* items showed convergence. These results provided tentative support for Hypothesis 2a.

The next step was to test whether a higher-ordered factor underlies the nine factors. A CFA of this second-ordered factor model did not have an acceptable fit (results not shown). A variety of alternative models with one or more second-ordered factors were constructed with no success in uncovering a supervening factor. Thus, these findings corroborated Hypothesis 3.

An examination of the correlations among the nine factors revealed why a single second-ordered factor does not fit the nine factors (Table 6). Two findings stood out in particular. The correlations among *Negative Spiritual Experience*, *Negative Congregational Support*, and the other factors were weak or nonexistent. A single second-ordered factor as a common cause of the nine factors would have created associations among all the second-ordered factors. Also, the correlation coefficient of 0.98 between *Love/Appreciation* and *Forgiveness* suggested that these tap the same dimension. A recommended solution would be to merge *Forgiveness* into *Love/Appreciation*. Thus, there appeared to be eight, not nine, dimensions to the collective of retained items: *Meaning/Peace*, *Tangible Connection to the Divine*, *Positive Religious Coping*, *Love/Appreciation*, *Negative Religious Coping*, *Positive Congregational Support*, *Negative Congregational Support*, and *Cultural Practices*. Thus, Hypothesis 2a required refinement. Furthermore, the results provided partial support for Hypothesis 4: Factors aligned along the positive–negative split, but the spirituality–religiousness distinction was also preserved.

Discussion

This study investigated the extent to which multiple domains of spirituality/religion reflected in the BMMRS can be assessed by using items from the DUREL, the FACIT-SpEx, and the RCOPE, measures previously used in patients with HIV. No support was found for a one-factor, a six-factor, or any higher-order factor model. Instead, the results indicated an eight-factor solution.

The four-factor model that emerged from items thought to form *Positive Spiritual Experiences* was somewhat surprising. Previous research suggested that positive experiences, whether religious or spiritual, are interrelated (Johnstone et al. 2009). However, the correlations among these items in our sample were not strong enough to form a single domain, thus partly refuting the recent BMMRS re-formulation (Johnstone et al. 2009). Spiritual and religious items, even if both represent positive experiences, still loaded on separate factors. For example, the spirituality (FACIT-SpEx) items loaded on two factors: *Meaning/Peace* and *Love/Appreciation*. Another factor emerged solely from four *Positive Religious Coping* items. These findings are consistent with the literature that distinguishes spirituality and religiosity as distinct concepts (Miller and Thoresen 2003). Also, the fact that the *Positive Religious Coping* items formed a separate factor confirms a positive–negative split in religious coping (Pargament et al. 2000). Only one of the four new domains, *Tangible Connection to the Divine*, includes a combination of items from the FACIT-SpEx, the DUREL, and the “other” RCOPE items. These items appear to all tap a relationship to a higher power, something that both spirituality and religion/religiousness measures have historically attempted to capture.

There are at least two plausible explanations as to why some items did not fit into the four domains that replaced *Positive Spiritual Experiences*. One group of items, derived from the FACIT-SpEx, addresses concepts such as hope, harmony, or productivity, which are not necessarily unique to issues of faith and spirituality. Others have already questioned—though have not formally tested—whether the FACIT-Sp items tap something specifically spiritual or religious or whether they simply measure aspects of positive existential psychology (Hall et al. 2008; Koenig 2008a; Koenig et al. 2001). For example, the item “I feel peaceful” could perhaps become more spiritually relevant by adding a phrase “because of my spiritual beliefs.” The second group of items may simply comprise “bad items” (DeVellis 1991). Some are lengthy (e.g., “Throughout the course of my day, I feel a sense of thankfulness for what others bring to my life”), and some are double-barreled or tap multiple ideas (e.g., “Sought *help* from God in letting go of my *anger*” or “Looked to God for *strength*, *support*, and *guidance*”).

A qualitative assessment of the items and findings for the remaining scales also clarifies how the items “hang (or do not hang) together.” The items that fit the *Negative Spiritual Experience* scale are actually the *Negative Religious Coping* items, whereas two items that do not fit (“I have trouble feeling peace of mind” and “My life lacks meaning and purpose”) represent the *Meaning/Peace* subscale (FACIT-SpEx). Even though the two items express negative experiences, they do not fit together with the *Negative Religious Coping* items. These results seem to weaken the argument for de-emphasizing the spirituality-religion distinction while emphasizing positive versus negative experiences (Johnstone et al. 2009). Furthermore, the item “Questioned God’s love for me” may have fallen out because of its weaker intensity vis-à-vis the other items, which seem “harsher”—referring to punishment and abandonment by God and “the devil’s doing.” Single items also fell out from the *Forgiveness* and the *Positive* and *Negative Congregational Support* scales. In each case, the dropped item was somewhat different from the remaining items—for example, expressing action versus attitudes/feelings (“*Asked forgiveness for my sins*” vs. “able to forgive” or “feel forgiven” in the remaining items), addressing interpersonal versus group-level relationship (“Wondered whether my clergy was really there for me” versus items that refer to the congregation, church, or clergy as a group), or using similar statement structure but different wording (“*Asked clergy to remember me in their prayers*” vs. “*Asked others to pray for me*”).

Although the findings did not corroborate all hypothesized items, support was found for five out of the six hypothesized domains (Johnstone et al. 2009). In particular, the findings fully supported the hypothesized *Cultural Practices* scale. That is, the items that make up the scale appear to represent a single domain of religious activities, in contrast to the split into *organizational* and *private* religious activities underlying the original BMMRS framework (Fetzer Institute and National Institute on Aging Working Group 1999) and other measures (e.g., the DUREL).

The differences in the findings between this study and past studies could be due to varying methodological approaches. For example, this study assumed a reflective factor structure (see Technical Appendix) underlying the measurement of spirituality/religion. However, it is uncertain if the existing measures of spirituality/religion were developed as reflective measures; the literature does not fully explain the conceptual background guiding the development of some of the measures. There is some indication that the DUREL may have been developed as a formative scale; scores on individual items (at least, for intrinsic religiosity) are typically summed to create an overall “index” of religiosity (Hill and Hood 1999; Koenig et al. 1997). The fact that the DUREL’s intrinsic religiosity items did not fit our data suggests that a different type of measurement model, such as a formative model, may be more appropriate. Other alternative models could explain some of our findings. For example, a second-higher-order factor model could conceivably account for the strong association between the first and fourth and between the second and third dimensions that emerged in place of *Positive Spiritual Experience*. However, such a model could not be tested because it is not identified (Kline 2005). Future research may be able to investigate this possibility. Furthermore, guided by the principles of reflective measurement, we chose CFA as the primary analytic procedure, whereas some past studies used principal components analysis (PCA) (Johnstone et al. 2009; Peterman et al. 2002). PCA has certain limitations, sometimes yielding factors that are not necessarily unidimensional. Our CFA results actually showed multiple dimensions for items that were previously suggested by PCA to be unidimensional (i.e., *Positive Spiritual Experience*) (Johnstone et al. 2009).

Lastly, this study used data from patients with HIV, whereas many BMMRS validation studies were conducted in healthy populations (Idler et al. 2003; Neff 2006; Piedmont et al. 2007; Stewart and Koeske 2006). The particular disease state should be considered in the

conceptual framework, as it may highlight dimensions of spirituality/religion that are important in a specific population. Past research (often qualitative) has found various aspects of spirituality/religion to be salient in patients with HIV, including relationship with a supreme being, prayer and meditation, healing, and religiosity (Sowell et al. 2000); “connectiveness,” belief systems, and transcendence (Belcher et al. 1989); peace and love (Guillory et al. 1997; Sowell et al. 2000); and comfort, strength, social support, self-acceptance, and reduction of self-blame (Siegel and Schrimshaw 2002). Most of these ideas are reflected in the multidimensional construct of spirituality/religion that emerged in this study. In particular, strong support was found for spirituality and religion as distinct, but overlapping, concepts. Research has shown that some patients with HIV equate spirituality with religion, whereas others say that the terms are distinct (Belcher et al. 1989). Data from one study emerged along several dimensions, some implying religious beliefs, such as relating to and believing in God or a Higher Power; being guided or helped; being inspired by gifts; expressing spirituality outwardly; journeying, discovering, centering; and feeling the presence of God or a Higher Power (Tuck and Thinganjana 2007). In another study, most persons with HIV espoused spiritual beliefs not related to a formal church or organized religion (Jenkins 1995). Although some authors (Hall et al. 2008; Koenig et al. 2001) advocate against the newer conceptualizations of spirituality (such as those underlying the FACIT-SpEx), some spirituality dimensions did fit well within the spirituality/religion measurement model in this study—alongside some other dimensions that define spirituality within the framework of religious beliefs.

This study had some measurement limitations. When CFA failed to corroborate the hypothesized factor structure with the subsets of DUREL, FACIT-SpEx, and RCOPE items loading on the six BMMRS domains, the analysis shifted from a corroborating to an exploratory effort. “Trimming” items from retained domains and identifying new domains with fewer items was data-driven, even with CFA as the analytic procedure. The discussion above provides some explanation for item abandonment, and the presented, data-driven findings appear to yield a theoretically sound set of conclusions. However, further studies should address this interpretation. In addition, alternative ways of measuring spirituality/religion beyond comprehensive/multidimensional assessments exist. Assessments that target selected aspects of spirituality/religion or specific religious contexts are also useful and should be developed and tested further (Hall et al. 2009).

In conclusion, this study attempted to clarify measuring spirituality/religion in health research, specifically in patients with HIV. The eight-factor model suggested by the findings should next be tested in other samples of patients with HIV and in other patient populations. In the future, consideration could be given to using the BMMRS alongside other spirituality/religion measures in order to further validate the conceptual framework that underlies the BMMRS. Because this study suggests that spirituality/religion may be measurable with fewer items from selected existing scales, other techniques (e.g., item response theory) could help to create shorter versions of a multidimensional assessment of spirituality/religion to be used in health outcomes research.

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Technical Appendix

Factor Analytic Techniques, Measurement Models, and Hypothesis Testing Criteria

Factor Analysis Techniques

Two major distinctions are important in factor analysis procedures. First, exploratory factor analysis (EFA) differs from confirmatory factor analysis (CFA). Furthermore, there are two major types of EFA: principal components analysis (PCA) and exploratory-common factor analysis (E-CFA). EFA is data-driven: items are inputted with a view to reduce a larger number of items to a smaller number of factors. In contrast, CFA is theory-driven: a specific

configuration of factor structure is posited, and CFA provides a test of whether that structure fits the data. Although PCA is often used, it has two limitations. First, it yields factors that are not necessarily unidimensional, even when each item “loads” only on one factor, because it is not specific to an underlying measurement model. Second, PCA provides the best fit of a set of items, but not necessarily a robust fit; PCA results often are not corroborated when CFA “tests” the PCA-suggested factor structure. This latter limitation is true of E-CFA as well.

Evaluation of CFA Models

Because CFA is theory-driven, the idea of “good model fit” has two aspects that are best separated analytically. First, one must determine whether one can trust the parameter estimates (e.g., the loadings and correlations among factors). And second, one must determine whether the parameter estimates corroborate one’s measurement ideas. CFA determines a “best solution possible” by iteratively deriving parameter estimates for the hypothesized model and comparing the inputted covariance matrix with the covariance matrix derived from the parameters. This process of successive approximation results in a solution that minimizes the differences between the two matrices. However, this “best solution possible” may not be a *good* fit per se. The foremost measure of goodness-of-fit is a chi-square analysis that attempts to ascertain whether the two matrices differ only by an amount falling within sampling variability. A relatively low chi-square value with a correspondingly high *P* value (given the degrees of freedom) indicates that one can trust the parameter estimates. However, chi-square is confounded by sample size because chi-square increases with sample size. Thus, a number of indicators are generally examined to determine whether the parameters estimates are dependable. Nevertheless, being able to trust the parameter estimates is a necessary but *not* sufficient condition for the hypothesized model’s corroboration. Of course, untrustworthy parameter estimates indicate a poor model fit and would lead one to reject the theorized model. However, if the indicators of fit suggest that one can trust parameter estimates, one must examine these estimates to determine whether they conform to the hypotheses, i.e., that they are statistically significant and sufficiently large versus statistically insignificant.

Measurement Models

One typology distinguishes between *reflective* and *formative* measurement models (Technical Appendix Fig. 1). A *reflective* model is one in which correlations among items are due to their *common cause*, the latent variable. A unidimensional factor or a group of unidimensional factors will take the form of a reflective measurement model(s). In contrast, a *formative* measurement model is one in which component parts (items) make up the whole (latent variable), i.e., they form the latent variable. The component parts (items) can be, but do not have to be, correlated; here, item correlations are not due to the latent variable. Although reflective models are typically validated by using psychometric techniques, such as factor analysis, such techniques should not be applied to validate formative models. Validation of formative models occurs initially through establishing content validity—that is, making sure that all key elements of the target/latent variable are incorporated into the measure. Inter-item correlations provide some indication for the type of measurement model that fits a particular scale, but do not constitute conclusive evidence.

Among reflective measurement models, different “ordered” factors are possible (see Technical Appendix Fig. 1). Items may parse into subsets with each subset loading on one factor. The factors are first-order factors. The set of factors may logically correlate because they share a common cause, a higher-ordered factor (a second-order factor).

Hypothesis Testing Criteria

The analysis had two objectives: to determine whether the parameter estimates (e.g., the loadings and correlations among factors) could be trusted and to examine whether the parameter estimates corroborated the hypothesized measurement ideas. The study proceeded by first running a model with a sample size of 200 so that the chi-square statistic reflected the difference in the inputted covariance matrix and the matrix derived from the best fit loadings, with minimum distortion due to sample size. When examination of the indicators of fit suggested that the parameter estimates were trustworthy, the model was rerun with the actual sample size of 450 patients to test the statistical significance of individual parameters. Indicators of fit considered to be noteworthy and trustworthy were as follows: A model that fits well would have a small chi-square value with a correspondingly larger P value (exceeding 0.05), indicating that the inputted observed variances and covariances do not differ from the variances and covariances based on the model's solution, to a greater extent than expected due to sampling variability. Other indicators of a good fit were high goodness-of-fit index (GFI) and adjusted goodness-of-fit index (AGFI) values—the closer these values were to 1.0, the better the fit. With a large number of variables, values greater than or equal to 0.8 were desirable. Fewer observed variables would increase the acceptable thresholds. The standardized root mean square residual (SRMR) is a type of standard error reflecting the difference in corresponding elements of a correlation matrix for the variables based on the estimated loadings versus those of the inputted covariance matrix. The tested model should be interpreted as being “drawn” from a population where about two-thirds of the differences in correlations are between plus or minus the SRMR value; if the two correlation matrices are drawn from the same population, one would expect the SRMR to be small. Furthermore, the Critical N indicates the sample size at which the P value for the chi-square statistic equals 0.01. In a well-fitting model, the Critical N value is 200 or greater. (Note that many would accept a chi-square statistic with an associated $P > 0.01$ as indicating an acceptable model fit, particularly when the number of observed variables is large.) The Critical N presented was the “tipping point” for $P = 0.01$ rather than $P = 0.05$. Finally, the study followed the convention that an item was not acceptable if it loaded on more than a single factor (items must have had a factor complexity equal to 1).

Fig. 1.
Reflective versus formative measurement models and first and second (higher)-order measurement models

Table 1

Hypothesized groupings of items from the Duke Religion Index (DUREL), the Functional Assessment of Chronic Illness Therapy-Spirituality-Expanded (FACIT-Sp-Ex), and the RCOPE (Religious Coping) scales

Positive Spiritual Experience		Negative Spiritual Experience	
v1	I feel peaceful ^a	v4	I have trouble feeling peace of mind ^a
v2	I have a reason for living ^a	v8	My life lacks meaning and purpose ^a
v3	My life has been productive ^a	v37	Wondered whether God had abandoned me ^e
v5	I feel a sense of purpose in my life ^a	v38	Felt punished by God for my lack of devotion ^e
v6	I am able to reach down deep into myself for comfort ^a	v39	Wondered what I did for God to punish me ^e
v7	I feel a sense of harmony within myself ^a	v40	Questioned God's love for me ^e
v9	I find comfort in my faith or spiritual beliefs ^a	v42	Decided the devil made this happen ^e
v10	I find strength in my faith or spiritual belief ^a	v43	Questioned the power of God ^e
v11	My illness has strengthened my faith or spiritual beliefs ^a	<i>Forgiveness</i>	
v12	I know that whatever happens with my illness, things will be okay ^a	v17	I am able to forgive others for any harm they have ever caused me ^a
v13	I feel connected to a higher power (or God) ^a	v18	I feel forgiven for any harm I may have ever caused ^a
v14	I feel connected to other people ^a	v35	Asked forgiveness for my sins ^c
v15	I feel loved ^a	<i>Cultural Practices</i>	
v16	I feel love for others ^a	v24	How often do you attend church, synagogue, or other religious meetings? ^b
v19	Throughout the course of my day, I feel a sense of thankfulness for my life ^a	v25	How often do you spend time in private religious activities, such as prayer, meditation or Bible study? ^b
v20	Throughout the course of my day, I feel a sense of thankfulness for what others bring to my life ^a	<i>Positive Congregational Support</i>	
v21	I feel hopeful ^a	v52	Looked for spiritual support from clergy ^d
v22	I feel a sense of appreciation for the beauty of nature ^a	v53	Asked others to pray for me ^d
v23	I feel compassion for others in the difficulties they are facing ^a	v54	Looked for love and concern from the members of my church ^d
v27	In my life, I experience the presence of the Divine (God) ^b	v55	Sought support from members of my congregation ^d
v28	My religious beliefs are what really lie behind my whole approach to life ^b	v56	Asked clergy to remember me in their prayers ^d
v29	I try hard to carry my religion over into all other dealings in life ^b	<i>Negative Congregational Support</i>	
v30	Looked for a stronger connection with God ^c	v41	Wondered whether my church had abandoned me ^e
v31	Sought God's love and care ^c	v44	Disagreed with what the church wanted me to do or believe ^d
v32	Sought help from God in letting go of my anger ^c	v45	Felt dissatisfaction with the clergy ^d

Positive Spiritual Experience		Negative Spiritual Experience	
v33	Tried to put my plans into action together with God ^c	v46	Felt my church seemed to be rejecting or ignoring me ^d
<i>Positive Spiritual Experience</i>		<i>Negative Congregational Support</i>	
v34	Tried to see how God might be trying to strengthen me in this situation ^c	v47	Wondered whether my clergy was really there for me ^d
v36	Focused on religion to stop worrying about my problems ^c		
v48	Trusted that God would be by my side ^d		
v49	Looked to God for strength, support, and guidance ^d		
v50	Trusted that God was with me ^d		
v51	Sought comfort from God ^d		

^aFACIT Sp-Ex,

^bDUREL;

^cRCOPE Positive,

^d“Other” RCOPE items,

^eRCOPE Negative

Table 2

Results of confirmatory factor analysis of hypothesized Positive Spiritual Experience: four interrelated dimensions

Dimension	Item reference	Item	Loading ^a
Meaning/Peace			
	v5	I feel a sense of purpose in my life	0.86
	v2	I have a reason for living	0.84
	v1	I feel peaceful	0.75
	v3	My life has been productive	
	v6	I am able to reach down deep into myself for comfort	
	v7	I feel a sense of harmony within myself	
	v12	I know that whatever happens with my illness, things will be okay	
	v14	I feel connected to other people	
	v15	I feel loved	
	v19	Throughout the course of my day, I feel a sense of thankfulness for my life	
	v21	I feel hopeful	
Tangible Connection to the Divine			
	v13	I feel connected to a higher power (or God)	0.92
	v50	Trusted that God was with me	0.85
	v27	In my life, I experience the presence of the Divine (God)	0.74
	v9	I find comfort in my faith or spiritual beliefs	
	v10	I find strength in my faith or spiritual belief	
	v28	My religious beliefs are what really lie behind my whole approach to life	
	v29	I try hard to carry my religion over into all other dealings in life	
	v48	Trusted that God would be by my side	
	v49	Looked to God for strength, support, and guidance	
	v51	Sought comfort from God	
Positive Religious Coping			
	v31	Sought God's love and care	0.91
	v30	Looked for a stronger connection with God	0.86
	v33	Tried to put my plans into action together with God	0.80
	v34	Tried to see how God might be trying to strengthen me in this situation	0.77
	v11	My illness has strengthened my faith or spiritual beliefs	
	v32	Sought help from God in letting go of my anger	
	v36	Focused on religion to stop worrying about my problems	
Love/Appreciation			
	v16	I feel love for others	0.72
	v22	I feel a sense of appreciation for the beauty of nature	0.64
	v23	I feel compassion for others in the difficulties they are facing	
None			
	v20	Throughout the course of my day, I feel a sense of thankfulness for what others bring to my life	
Model Fit Statistics			

Dimension	Item reference	Item	Loading ^a
Chi-square			37.64
<i>df</i>			48
<i>P</i>			0.859
GFI			0.969
AGFI			0.950
SRMR			0.028
Critical <i>N</i>			379

GFI goodness-of-fit index, *AGFI* adjusted goodness-of-fit index, *SRMR* standardized root mean squared residual

^aNo loading indicates an item excluded from a model with acceptable model fit

Table 3

Correlations among four dimensions of Positive Religious Experience

Dimension		1	2	3
1	Meaning/Peace	1.00		
2	Tangible Connection to the Divine	0.50	1.00	
3	Positive Religious Coping	0.36	0.82	1.00
4	Love/Appreciation	0.80	0.57	0.43

Loadings and model fit statistics are listed in Table 2

Table 4

Results of confirmatory factor analyses of other hypothesized dimensions

Dimension(s) ^a	Item reference	Item	Loading ^b	Model Fit Statistics	
				Statistic	Estimate
a. Negative Religious Experience	v38	Felt punished by God for my lack of devotion	0.79	Chi-square	4.72
	v39	Wondered what I did for God to punish me	0.78	df	5
	v37	Wondered whether God had abandoned me	0.59	P	0.451
	v43	Questioned the power of God	0.49	GFI	0.991
	v42	Decided the devil made this happen	0.46	AGFI	0.972
	v4	I have trouble feeling peace of mind		SRMR	0.026
	v8	My life lacks meaning and purpose		Critical N	642
	v40	Questioned God's love for me			
b. Forgiveness and Cultural Practices ^c					
Forgiveness ^d					
	v17	I am able to forgive others for any harm they have ever caused me	0.71	Chi-square	0.08
	v18	I feel forgiven for any harm I may have ever caused	0.69	df	1
	v35	Asked forgiveness for my sins		P	0.783
				GFI	1.000
Cultural Practices ^d					
	v24	How often do you attend church, synagogue, or other religious meetings?	0.73	AGFI	0.998
	v25	How often do you spend time in private religious activities, such as prayer, meditation or Bible study?	0.61	SRMR	0.003
				Critical N	17,397
c. Positive Congregational Support					
	v54	Looked for love and concern from the members of my church	0.95	Chi-square	3.60
	v53	Asked others to pray for me	0.94	df	2
	v52	Looked for spiritual support from clergy	0.76	P	0.168
	v56	Asked clergy to remember me in their prayers	0.65	GFI	0.991
	v55	Sought support from members of my congregation		AGFI	0.956
				SRMR	0.0192
				Critical N	511

Dimension(s) ^a	Item reference	Item	Loading ^b	Model Fit Statistics	
				Statistic	Estimate
d. Negative Congregational Support					
	v45	Felt dissatisfaction with the clergy	0.95	Chi-square	1.78
	v46	Felt my church seemed to be rejecting or ignoring me	0.88	df	2
	v44	Disagreed with what the church wanted me to do or believe	0.62	P	0.410
	v41	Wondered whether my church had abandoned me	0.61	GFI	0.996
	v47	Wondered whether my clergy was really there for me		AGFI	0.978
				SRMR	0.0116
				Critical N	1,056

GFI goodness-of-fit index, AGFI adjusted goodness-of-fit index, SRMR standardized root mean squared residual

^aOne-factor models except where indicated otherwise

^bNo loading indicates an item excluded from a model with acceptable model fit

^cTwo-factor model

^d $r(\textit{Forgiveness, Cultural Practices}) = 0.50$

Table 5

Results of confirmatory factor analysis—loading refined set of items simultaneously on nine latent variables representing dimensions of spirituality/religion

Dimension	Item reference	Item	Loading	Loading from Tables 2 and 4
Meaning/Peace				
	v5	I feel a sense of purpose in my life	0.86	0.86
	v2	I have a reason for living	0.83	0.84
	v1	I feel peaceful	0.76	0.75
Tangible Connection to the Divine				
	v13	I feel connected to a higher power (or God)	0.92	0.92
	v50	Trusted that God was with me	0.84	0.85
	v27	In my life, I experience the presence of the Divine (God)	0.74	0.74
Positive Religious Coping				
	v31	Sought God's love and care	0.90	0.91
	v30	Looked for a stronger connection with God	0.87	0.86
	v33	Tried to put my plans into action together with God	0.80	0.80
	v34	Tried to see how God might be trying to strengthen me in this situation	0.76	0.77
Love/Appreciation				
	v16	I feel love for others	0.72	0.72
	v22	I feel a sense of appreciation for the beauty of nature	0.65	0.64
Negative Spiritual Experience				
	v38	Felt punished by God for my lack of devotion	0.78	0.79
	v39	Wondered what I did for God to punish me	0.75	0.78
	v37	Wondered whether God had abandoned me	0.62	0.59
	v43	Questioned the power of God	0.50	0.49
	v42	Decided the devil made this happen	0.48	0.46
Forgiveness				
	v17	I am able to forgive others for any harm they have ever caused me	0.65	0.71
	v18	I feel forgiven for any harm I may have ever caused	0.74	0.69
Cultural Practices				
	v24	How often do you attend church, synagogue, or other religious meetings?	0.69	0.73
	v25	How often do you spend time in private religious activities, such as prayer, meditation or Bible study?	0.66	0.61
Positive Congregational Support				
	v54	Looked for love and concern from the members of my church	0.84	0.95
	v53	Asked others to pray for me	0.75	0.94
	v52	Looked for spiritual support from clergy	0.82	0.76
	v56	Asked clergy to remember me in their prayers	0.87	0.65
Negative Congregational Support				
	v45	Felt dissatisfaction with the clergy	0.83	0.95
	v46	Felt my church seemed to be rejecting or ignoring me	0.82	0.88
	v44	Disagreed with what the church wanted me to do or believe	0.75	0.62

Dimension	Item reference	Item	Loading	Loading from Tables 2 and 4
	v41	Wondered whether my church had abandoned me	0.59	0.61
Model Fit Statistics				
		Chi-square		364
		<i>df</i>		341
		<i>P</i>		0.188
		GFI		0.889
		AGFI		0.857
		SRMR		0.063
		Critical <i>N</i>		228

GFI goodness-of-fit index, *AGFI* adjusted goodness-of-fit index, *SRMR* standardized root mean squared residual

Table 6

Correlations among nine latent variables representing dimensions of spirituality/religion

Dimension	1	2	3	4	5	6	7	8
1 Meaning/Peace	1.00							
2 Tangible Connection to the Divine	0.50	1.00						
3 Positive Religious Coping	0.36	0.82	1.00					
4 <u>Love/Appreciation</u>	0.80	0.57	0.43	1.00				
5 Negative Spiritual Experience	-0.23	-0.02	0.25	-0.28	1.00			
6 Forgiveness	0.62	0.65	0.56	<u>0.98</u>	-0.13	1.00		
7 Cultural Practices	0.34	0.80	0.81	0.34	0.03	0.50	1.00	
8 Positive Congregational Support	0.28	0.51	0.66	0.23	0.18	0.38	0.70	1.00
9 Negative Congregational Support	-0.25	-0.12	0.01	-0.11	0.35	-0.16	-0.09	-0.06

Loading and model fit statistics are listed in Table 5. Uncorrelated factors are marked in bold. Overlappings are underlined