Review Article

Religion, Spirituality, and Physical Health in Cancer Patients: A Meta-Analysis

Heather S. L. Jim, PhD[1]; James E. Pustejovsky, PhD[2]; Crystal L. Park, PhD[3]; Suzanne C. Danhauer, PhD[4]; Allen C. Sherman, PhD[5]; George Fitchett, PhD[6]; Thomas V. Merluzzi, PhD[7]; Alexis R. Munoz, MPH[8]; Login George, MA[3]; Mallory A. Snyder, MPH[8,9]; and John M. Salsman, PhD[8,9]

Although religion/spirituality (R/S) is important in its own right for many cancer patients, a large body of research has examined whether R/S is also associated with better physical health outcomes. This literature has been characterized by heterogeneity in sample composition, measures of R/S, and measures of physical health. In an effort to synthesize previous findings, a meta-analysis of the relation between R/S and patient-reported physical health in cancer patients was performed. A search of PubMed, PsycINFO, the Cumulative Index to Nursing and Allied Health Literature, and the Cochrane Library yielded 2073 abstracts, which were independently evaluated by pairs of raters. The meta-analysis was conducted for 497 effect sizes from 101 unique samples encompassing more than 32,000 adult cancer patients. R/S measures were categorized into affective, behavioral, cognitive, and 'other' dimensions. Physical health measures were categorized into physical well-being, functional well-being, and physical symptoms. Average estimated correlations (Fisher *z* scores) were calculated with generalized estimating equations with robust variance estimation. Overall R/S was associated with overall physical health ($z = 0.153$, $P < .001$); this relation was not moderated by sociodemographic or clinical variables. Affective R/S was associated with physical well-being ($z = 0.167$, $P < .001$), functional well-being ($z = 0.343$, $P < .001$), and physical symptoms ($z = 0.282$, $P < .001$). Cognitive R/S was associated with physical well-being ($z = 0.079$, $P < .05$) and functional well-being ($z = 0.090$, $P < .01$). 'Other' R/S was associated with functional well-being ($z = 0.100$, $P < .05$). In conclusion, the results of the current meta-analysis suggest that greater R/S is associated with better patient-reported physical health. These results underscore the importance of attending to patients' religious and spiritual needs as part of comprehensive cancer care. ***Cancer*** **2015;121:3760-8.**

KEYWORDS: cancer, meta-analysis, quality of life, religion, spirituality.

INTRODUCTION

Religion (eg, religious affiliation and service attendance) and spirituality (eg, a connection to a source larger than oneself and feelings of transcendence) are important aspects of everyday life for many people; a recent poll found that 59% of people worldwide describe themselves as religious, regardless of whether they regularly attend religious services.[1] Religion/spirituality (R/S) can be particularly important for individuals with a cancer diagnosis. The National Health Interview Survey found that 69% of cancer patients reported praying for their health, whereas only 45% of the general US population did.[2] R/S can help cancer patients find meaning in their illness[3] and provide comfort in the face of existential fears,[4] and these patients can receive support from a community of likeminded individuals.[5] Much has been written about the importance of addressing spiritual needs as part of patient-centered cancer care.[6-8] Nevertheless, studies examining the effects of R/S on health outcomes for cancer patients have reported mixed results, likely in part because of small samples and heterogeneous measures of religion, spirituality, and physical health.[9,10] Varying definitions of R/S have also likely contributed to heterogeneous measures and, in turn, mixed results.

Corresponding author: Heather S. L. Jim, PhD, Department of Health Outcomes and Behavior, Moffitt Cancer Center, 12902 Magnolia Drive MRC-PSY, Tampa, FL 33612; Fax: (813) 745-3906; heather.jim@moffitt.org

[1]Department of Health Outcomes and Behavior, Moffitt Cancer Center, Tampa, Florida; [2]Department of Educational Psychology, University of Texas at Austin, Austin, Texas; [3]Department of Psychology, University of Connecticut, Storrs, Connecticut; [4]Department of Social Sciences & Health Policy, Wake Forest School of Medicine, Winston Salem, North Carolina; [5]Behavioral Medicine Division, Winthrop P. Rockefeller Cancer Institute, University of Arkansas for Medical Sciences, Little Rock, Arkansas; [6]Department of Religion, Health, and Human Values, Rush University Medical Center, Chicago, Illinois; [7]Department of Psychology, University of Notre Dame, Notre Dame, Indiana; [8]Department of Medical Social Sciences, Northwestern University Feinberg School of Medicine, Chicago, Illinois; [9]Robert H. Lurie Comprehensive Cancer Center, Northwestern University, Chicago, Illinois.

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Additional Supporting Information may be found in the online version of this article.

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Greater clarity is needed to advance research and clinical applications with respect to the role of R/S across the cancer continuum from diagnosis and active treatment to survivorship and the end of life. To this end, we conducted a series of meta-analyses to quantitatively summarize associations between R/S and patient-reported mental, social, and physical health outcomes.[11,12] The current study focuses on physical health outcomes, including physical well-being, functional well-being, and self-reported physical symptoms.

R/S is theorized to affect physical health via 2 primary pathways: behavioral self-regulation and emotional self-regulation.[13,14] As for behavioral self-regulation, it has long been noted that religious affiliation and participation are associated with salutary health behaviors, such as avoidance of alcohol, tobacco, and drug use as well as fewer sexual partners.[15,16] Religious communities can also provide tangible support, such as transportation to medical appointments and the provision of meals and other basic care needs. In contrast, religious fatalism is associated with worse compliance with screening and treatment recommendations,[17,18] whereas some religious sects proscribe health behaviors such as immunization and the receipt of blood products. As for emotional self-regulation, religious fellowship can enhance positive emotion through social support, whereas R/S rituals and faith can provide hope, forgiveness, comfort, love, and other emotional benefits.[13] A large body of literature has demonstrated the stress-buffering effects of R/S on physiological processes such as reduced cardiovascular reactivity, hypothalamic-pituitary-adrenal axis activation, and inflammation, which may improve health outcomes.[19] In addition, because poor health habits can be viewed as behavioral attempts at emotional regulation (eg, alcohol, tobacco, drug use, and poor diet), the emotional benefits of R/S may favorably influence health behaviors.[13] Consequently, in the current study, we hypothesized that R/S would be associated with better physical health. Additional analyses examined whether dimensions of R/S were associated with specific physical health outcomes and whether sociodemographic or clinical variables (eg, the mean age of the sample, sex composition, and cancer type) moderated relationships between R/S and physical health. Because additional analyses were exploratory, no a priori hypotheses were made.

MATERIALS AND METHODS

Definition of Terms

R/S was conceptualized a priori as being composed of affective, behavioral, and cognitive dimensions.[20] Briefly, the affective dimension was defined as the subjective emotional experience of R/S, such as a sense of transcendence, meaning, purpose, and connection to a source larger than oneself as well as struggling with or feeling anger toward God. Affective R/S was conceptualized as one of many sources of emotional well-being; thus, there is overlap between the 2 constructs, but there is also a distinction (see Salsman et al[11]). The behavioral dimension was defined as the use of religious or spiritual practices or behaviors to manage stress and life events related to cancer and its treatment, such as meditation; prayer; pursuing a connection with God; attending religious services; and strengthening connections with religious persons, activities, or groups. The cognitive dimension was defined as statements that an individual believes to be true about R/S, such as causal attributions, spiritual posttraumatic growth, religious fatalism, and intrinsic religious or spiritual beliefs. Measures that did not fit well into these dimensions or encompassed multiple dimensions were included in an 'other' category (eg, religious social support and religious affiliation). Physical health was defined a priori as physical well-being (ie, an ability to perform activities of daily living ranging from basic self-care to more strenuous physical activities), functional well-being (ie, perceived difficulties in fulfilling roles at home, at work, or in the community due to physical health), and self-reported physical symptoms (ie, fatigue, pain, sleep, cognition, and other physical symptoms).

Search Strategy

Standardized search strategies were developed and applied. Four electronic databases (PubMed, PsycINFO, the Cumulative Index to Nursing and Allied Health Literature, and the Cochrane Library) were systematically reviewed with controlled vocabulary terms for R/S (eg, religio* and spiritual*), cancer (eg, neoplasms, cancer, and leukemia), and health outcomes (eg, measure, scale, and outcome*), which were specific to each database. Details regarding the search strategy are presented in Supporting Information I (see online supporting information). The searches included studies published in English from the earliest publication date available in each database through December 20, 2013. Unpublished studies were requested via professional listservs of the Society of Behavioral Medicine (Cancer Special Interest Group), the American Psychosocial Oncology Society (Cancer Survivorship Special Interest Group), and the American Psychological Association (Divisions 36 [Religion and Spirituality] and 38 [Health Psychology]).

Inclusion Criteria

Studies were included if they (1) had an adult sample (≥18 years old) having a current or past diagnosis of cancer or undergoing procedures for a diagnosis of cancer at the time of study entry; (2) assessed an R/S variable; (3) assessed a physical, mental, or social health variable; and (4) reported an effect size measuring the bivariate association between R/S and health. Descriptive and measure development or validation studies were included if they otherwise met study inclusion criteria. Data from intervention studies were included except when the relation between R/S and health outcomes was potentially confounded by intervention effects. Excluded studies were (1) qualitative assessments of R/S or health, (2) R/S intervention studies if the intervention was the only index of R/S, (3) needs assessments of R/S or health, and (4) caregiver or pediatric samples.

Screening Procedures

Individual rater pairs reviewed abstracts to determine which articles merited a full review. All abstracts were reviewed independently, and discrepancies were resolved by consensus. Studies meeting all criteria or possibly meeting all criteria (ie, this was unable to be determined from the abstract) underwent a full-text review. Four rater pairs independently reviewed the studies and entered data abstracted from the articles. R/S measures were categorized as affective, behavioral, cognitive, or other. Outcome measures were categorized as physical, social, mental, or other. Data from subscale scores, if available, were used in place of total scores to maximize analytic flexibility and improve the interpretability of findings. Discrepancies were resolved by rater consensus. When articles provided insufficient data, attempts were made to contact authors for the required details.

Effect Size Measures

The meta-analysis was limited to studies that reported measures of bivariate association between R/S and physical health. Thus, the following types of effect size statistics were included: Pearson product-moment correlation coefficients, Spearman rank correlation coefficients, standardized mean differences between groups, and odds ratios based on the dichotomization of 2 continuous variables. If an effect size estimate was not directly reported, an attempt was made to calculate it on the basis of the information provided in the article. Multi-variable measures of association, such as regression coefficients and partial correlation coefficients, were excluded because they are not generally comparable to measures of bivariate association and present considerable analytic complications.[21]

Effect sizes were coded in a standard way so that a positive relation between R/S and health outcomes reflected more R/S and better health. For purposes of meta-analysis, all reported effect sizes were converted to the Fisher z scale, a nonlinear transformation of Pearson's correlation measure. The Fisher z scale was chosen because it normalizes and stabilizes the sampling variance of Pearson correlation coefficients, which constituted the majority of effect size measures in the meta-analysis, and because it has an unbounded range.[22] Results are presented in z scale units, which were found in the current meta-analysis to be comparable in magnitude to reverse-transformed Pearson correlations.

Moderator Variables

On the basis of the existing literature base,[23-25] we anticipated that relationships between R/S and health variables might vary as a function of several demographic and clinical characteristics. Accordingly, we coded articles to examine the degree to which these characteristics might moderate relationships between R/S and health indices. Demographic characteristics included sex, age, race, and geographic origin of the sample. Clinical characteristics included the cancer type, cancer stage, and phase of the cancer continuum (ie, diagnosis/treatment, posttreatment survivorship, and end of life).

Meta-Analytic Procedures

Many studies meeting inclusion criteria provided effect size data for multiple measures of R/S, multiple measures of health outcomes, or both, all based on a common sample of participants. (A few studies reported results from more than 1 independent sample of respondents. In these cases, each unique sample was treated as an independent study. For simplicity of presentation, we do not distinguish between independent studies and independent samples reported in the same study.) Consequently, a generalized estimating equation (GEE) approach and robust variance estimation were used to estimate average effect sizes and meta-regressions, which allowed valid inferences even when the covariance structure of effect sizes drawn from common studies was unknown or misspecified.[26] For inferences regarding single meta-regression coefficients (eg, for testing the difference in the magnitude of effect sizes between the affective and behavioral R/S dimensions), we employed robust t tests involving small-sample corrections proposed by Tipton.[27] For inferences regarding multiple meta-regression coefficients (eg, for

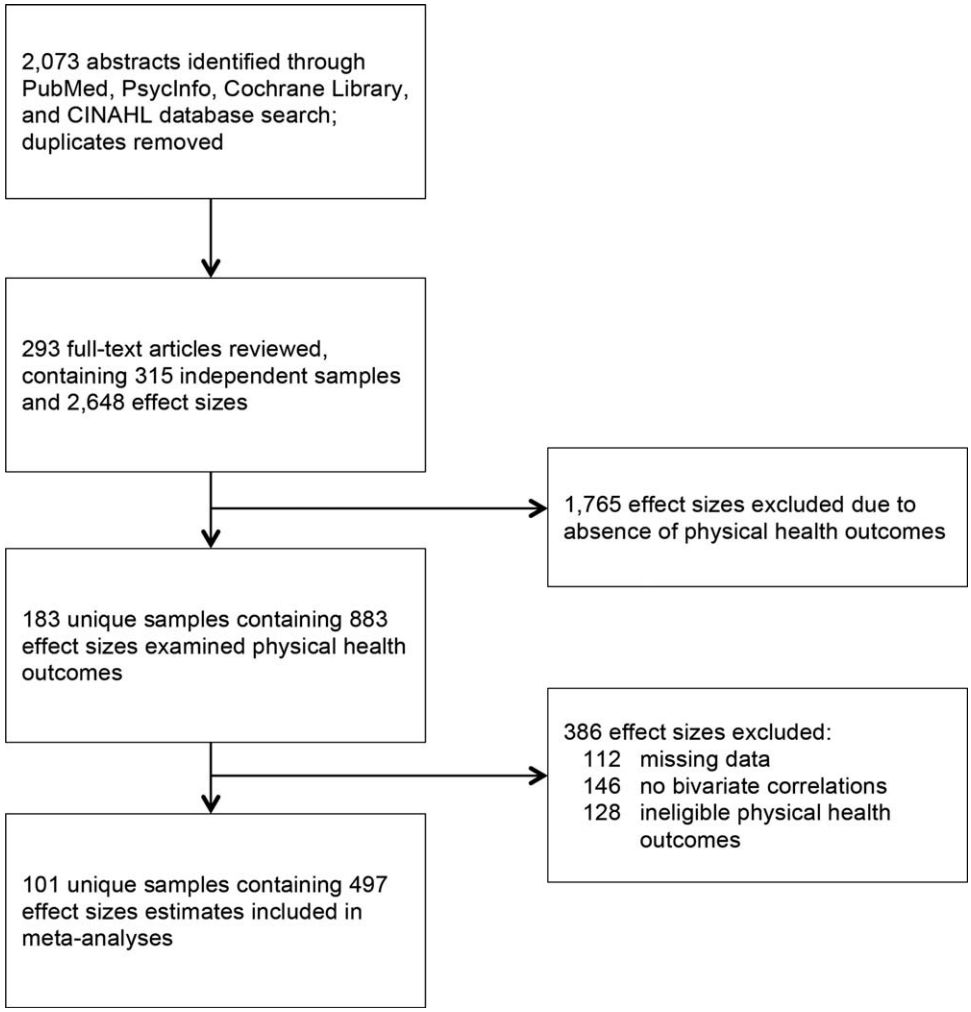

Figure 1. Flow chart of the selection of studies. CINAHL indicates Cumulative Index to Nursing and Allied Health Literature.

simultaneously testing differences between all 4 R/S dimensions), we used robust Wald test statistics, which follow chi-square reference distributions when the number of independent studies is large.[28] (We are not aware of any small-sample corrections for robust tests of multiple regression coefficients.) Weights for the GEE analysis were determined according to a hierarchical model containing between-study and within-study random effects.

RESULTS

Study Selection

As shown in Figure 1, 2073 unique abstracts were identified through electronic databases. The full text was retrieved for 293 studies, which encompassed 2648 unique effect sizes. For physical health outcomes, 883 effect sizes from 183 unique samples were identified; 128 of these effect sizes were excluded because they focused on a physical health outcome that (1) had been diagnosed before the assessment of R/S (eg, comorbidities, disease severity, or recurrence), (2) was examined in only a small number of studies (eg, cytokines or health behaviors), or (3) was context-dependent (eg, end-of-life care or health care utilization). Another 112 effect sizes were excluded because of missing data, and 146 were excluded because they were not bivariate correlations. Consequently, the current study examined 497 effect sizes from 101 unique samples. Characteristics of the included studies are described in Supporting Information II (see online supporting information).

Study Participants

The included samples comprised a total of more than 32,000 patients. Individual samples ranged in size from 11 to 8000 patients with a median of 153 patients and a

TABLE 1. Estimated Associations Between Religion/Spirituality and Overall Physical Health

Religion/ Spirituality Dimension	Estimate (Standard Error)	*t* Value	Number of Unique Samples	Number of Effect Sizes
All	0.153 (0.019)	8.24[a]	101	497
Affective	0.263 (0.023)	11.31[a]	55	223
Behavioral	0.010 (0.017)	0.58	29	96
Cognitive	0.065 (0.016)	3.94[a]	22	90
Other	0.079 (0.030)	2.62[b]	23	88

Estimates are *z*-scale effect sizes.
[a] $P < .001$.
[b] $P < .05$.

mean of 321 patients (standard deviation [SD] = 909) per sample. Across samples, the mean patient age was 57.4 years (SD = 7.5 years). The mean proportion of female patients was 65.3% (SD = 28.0%). Sixty-three percent of samples came from North America; among these samples, the mean percentage of Caucasian patients was 70.1% (SD = 32.4%). Across all included samples, 26% focused on the diagnosis and treatment phase of the cancer continuum, 23% focused on the posttreatment survivorship phase, 13% focused on the end-of-life phase, and 39% focused on multiple phases. As for the cancer type, 22% of the samples focused exclusively on breast cancer, 22% focused exclusively on another cancer (eg, colorectal or thoracic cancer), and 56% focused on a mix of cancer types. As for the stage at diagnosis, 8% focused on patients with early-stage disease (ie, in situ or local), 17% focused on advanced-stage disease (ie, regional or metastatic), 42% were mixed, and 34% did not report the disease stage.

Meta-Analysis

A GEE analysis was conducted to determine the average effect size between R/S and physical health with pooling across all dimensions of R/S. The results are displayed in Table 1. R/S was significantly associated with physical health ($z = 0.153$, $P < .001$). Additional analyses were conducted to determine whether the average effect size between R/S and physical health differed by R/S dimension. As shown in Table 1, the dimensions significantly associated with physical health included affective, cognitive, and 'other' R/S ($P < .05$) but not behavioral R/S ($P = .57$).

Analyses were also conducted to examine whether the average effect size between overall R/S and physical health differed by physical health subdomain, including physical well-being, functional well-being, and self-reported physical symptoms (ie, fatigue, pain, sleep, cognition, and other physical symptoms). No differences in effect sizes were found among cognition, pain, sleep, fatigue, and other physical symptoms ($P = .52$), so these outcomes were collapsed into a single category labeled physical symptoms. Physical well-being and functional well-being were found to be significantly different from one another ($P < .01$). Consequently, analyses were conducted to estimate effect sizes between R/S dimensions and physical well-being, functional well-being, and physical symptoms. As shown in Table 2, affective R/S was significantly associated with all 3 categories of physical health, cognitive R/S was associated with physical well-being and functional well-being, and other R/S was associated with functional well-being ($P < .05$).

Correlations between R/S dimensions and physical health were further decomposed post hoc by the categorization of R/S measures within each dimension into subdimensions (see Supporting Information II [see online supporting information]). Within the affective dimension, the subdimensions were spiritual well-being (49 samples), spiritual distress (8 samples), R/S experiences (1 sample), and self-transcendence (1 sample). Within the behavioral dimension, the subdimensions were R/S coping (21 samples), private R/S activities (7 samples), public R/S activities (4 samples), and composite R/S activities (2 samples). Within the cognitive dimension, the subdimensions were R/S beliefs (8 samples), spiritual growth (7 samples), image of God (2 samples), locus of control (2 samples), R/S problem solving (2 samples), religious orientation (2 samples), causal attributions (1 sample), and R/S importance (1 sample). Within the 'other' dimension, subdimensions were composite indices of R/S (15 samples), other (6 samples), religious affiliation (2 samples), and R/S social support (2 samples). Subdimensions assessed in fewer than 3 independent samples were excluded from analyses. Relationships between the remaining subdimensions and physical health are shown in Table 3. Subdimensions significantly associated with physical health were spiritual well-being and spiritual distress in affective R/S and spiritual growth in cognitive R/S ($P < .05$).

Moderator Analyses

Sociodemographic (ie, average age of the sample, sex composition of the sample, and geographic origin of sample) and clinical variables (cancer type, cancer stage, and phase in the cancer continuum) were examined as moderators of the magnitude of the effect size between overall R/S and overall physical health. No moderators were statistically significant ($P > .08$).

TABLE 2. Estimated Associations Between Religion/Spirituality and Physical Health Subdomains

Religion/ Spirituality Dimension	Physical Well-Being			Functional Well-Being			Physical Symptoms		
	Estimate (Standard Error)	Number of Unique Samples	Number of Effect Sizes	Estimate (Standard Error)	Number of Unique Samples	Number of Effect Sizes	Estimate (Standard Error)	Number of Unique Samples	Number of Effect Sizes
All	0.098 (0.026)[a]	50	119	0.202 (0.025)[a]	54	136	0.154 (0.024)[a]	61	242
Affective	0.167 (0.038)[a]	33	58	0.343 (0.036)[a]	28	61	0.282 (0.034)[a]	28	104
Behavioral	−0.016 (0.022)	16	24	0.040 (0.023)	14	26	0.005 (0.020)	18	46
Cognitive	0.079 (0.033)[b]	8	20	0.090 (0.026)[c]	14	31	0.044 (0.021)	13	39
Other	0.032 (0.039)	13	17	0.100 (0.041)[b]	14	18	0.089 (0.049)	13	53

Estimates are *z*-scale effect sizes.
[a] $P < .001$.
[b] $P < .05$.
[c] $P < .01$.

Reporting Bias

The threat of a reporting bias was assessed through a visual inspection of funnel plots of the effect sizes for each R/S dimension (see Fig. 2). With the possible exception of the affective R/S dimension, the plots did not display any noticeable asymmetry that would indicate a reporting bias. A cluster-robust variant of Egger's test did not detect a reporting bias ($P = .08$). The marked heterogeneity of effects within each R/S dimension was apparent from the plots. Among the effect sizes excluded because of missing data, 30 effect sizes from 10 samples were noted to be statistically insignificant. In a sensitivity analysis, imputing a value of zero for each of these effect sizes and including them with the reported effect sizes did not alter the substantive results.

DISCUSSION

The current study, one of a series of meta-analyses focused on R/S in cancer patients, estimated the magnitude of associations between R/S and patient-reported physical health. Data were drawn from 101 unique samples encompassing more than 32,000 patients. Although previous research examining these associations has produced mixed results, the current meta-analysis found statistically significant relationships between overall R/S and physical health. Although it has long been known that R/S is important to many cancer patients, findings from the current study are noteworthy because they suggest that greater R/S is indeed associated with better physical health in this population. No sociodemographic or clinical variables moderated this association, and this suggests that these salutary relationships were not unique to a particular subgroup of patients.

An examination of dimensions of R/S indicated that affective R/S was most strongly related to physical health, with cognitive and 'other' R/S related to physical health to a lesser extent. Affective R/S was significantly associated with physical well-being, functional well-being, and physical symptoms. Both spiritual well-being and spiritual distress, affective subdimensions, were associated with

TABLE 3. Estimated Associations Between R/S Subdimensions and Physical Health

Dimension	Subdimension	Estimate (Standard Error)	Number of Unique Samples	Number of Effect Sizes
Affective	Spiritual well-being	0.281 (0.030)[a]	49	197
	Spiritual distress	0.192 (0.047)[b]	8	20
Behavioral	Private R/S activities	0.017 (0.031)	7	20
	Public R/S activities	0.084 (0.059)	4	9
	R/S coping	−0.010 (0.031)	21	66
Cognitive	R/S beliefs	0.045 (0.027)	8	26
	Spiritual growth	0.104 (0.029)[c]	7	17
Other	Composite R/S	0.076 (0.042)	15	53
	Other	0.131 (0.078)	6	17

Abbreviation: R/S, religion/spirituality.
Estimates are *z*-scale effect sizes adjusted for the number of independent samples.
[a] $P < .001$.
[b] $P < .01$.
[c] $P < .05$.

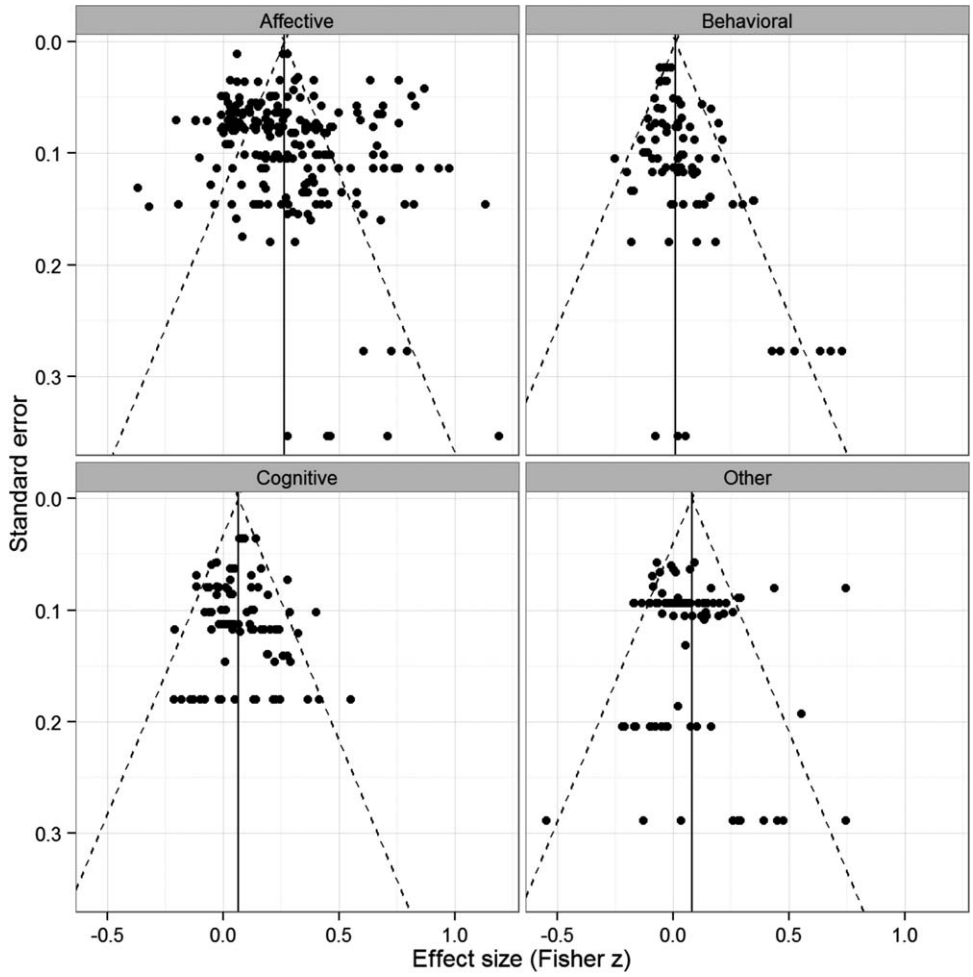

Figure 2. Funnel plots of effect sizes versus standard errors for each religion/spirituality dimension.

overall physical health. These findings are intriguing in light of observational and experimental studies suggesting that positive mood results in reduced symptom reporting.[29-32] Previous research regarding affect and symptom reporting has focused on general measures of positive mood rather than the specific emotions characteristic of spiritual well-being, such as a sense of transcendence, meaning, purpose, and spiritual connection. Because of the small number of studies examining objective health outcomes such as inflammation, disease recurrence, and survival, the current meta-analysis was unable to assess whether the association between affective R/S and physical health can be generalized beyond self-reported health. Nevertheless, spiritual distress or feelings of abandonment by God and/or one's religious community are associated with increased depression and decreased adherence to medication and medical advice among cancer patients, and this suggests a plausible pathway by which such an association could occur.[16,33,34] Future research should move beyond self-reported assessment to more sophisticated measures of putative biological and behavioral mechanisms of the relation between R/S and physical health.

Cognitive R/S was also significantly associated with better physical health, including both physical and functional well-being but not physical symptoms. As for cognitive R/S subdimensions, spiritual growth but not R/S belief was significantly associated with physical health. Measures of spiritual growth, such as the spiritual change subscale of the Posttraumatic Growth Inventory,[35] focus on the extent to which cancer is perceived to have positively affected patients' spiritual and religious lives. Patients who experience R/S with a new depth and richness after cancer may benefit from increased access to the emotional and behavioral self-regulatory resources of R/S that are theorized to promote physical health. It should be

noted that spiritual growth is often measured retrospectively; some studies have found that perceptions of growth result from patients' denigration of their own precancer attributes rather than true change.[36] Nevertheless, a positive reappraisal of cancer via perceived spiritual growth, even if illusory, may help patients maintain a connection to a loving God despite the disappointments and stresses inherent in the cancer experience.

R/S measures categorized as 'other' also showed a significant association with better physical health and specifically greater functional well-being. This dimension was primarily composed of measures of general or nonspecific religiousness or spirituality that encompassed more than one of the affective, behavioral, and cognitive dimensions. An examination of 'other' subdimensions, including composite measures of R/S versus 'other' measures that were not easily categorized elsewhere (eg, spiritual health and spiritual perspective), indicated nonsignificant relationships with physical health. Mixed findings regarding 'other' R/S, taken together with the nonsignificant association between behavioral R/S and physical health, suggest that associations between R/S and physical health are not robust across all R/S measures. This pattern of results underscores the importance of using a well-defined R/S taxonomy to guide future research questions.

To our knowledge, the current study is the first meta-analysis of R/S and patient-reported physical health in cancer patients. Strengths include an innovative and important research question, a large pool of samples from which data were drawn, and a rigorous statistical methodology. In addition, the examination of dimensions of R/S was based on an a priori taxonomy. Limitations should also be noted, however. Studies included in the meta-analysis tended to collect data from small samples of convenience, with nearly half of the studies including fewer than 150 participants. Moreover, method sections were often incomplete with respect to measures, procedures, and sample descriptions. In addition, R/S measures varied in quality; although many effect sizes resulted from psychometrically sound measures such as the Functional Assessment of Cancer Therapy–Spirituality,[37] Religious COPE,[38] and the Posttraumatic Growth Inventory,[35] other studies used measures that were more obscure or investigator-derived. In addition, the current meta-analysis was composed of bivariate correlations drawn mostly from cross-sectional studies, and this prevented us from making inferences regarding the strength or directionality of the causal relation between R/S and physical health. It could be argued that physical health may contribute to enhanced R/S. For example, patients in better health may be better able to experience greater meaning and peace (ie, affective R/S), attend religious services (behavioral R/S), and perceive God as benevolent (ie, cognitive R/S) in comparison with patients in poor health. The small number of longitudinal studies in the meta-analysis precluded an analysis of the study design as a moderator of effect size. Nevertheless, findings of physical benefits from interventions designed to enhance R/S indicate that R/S does contribute to better health.[39-41] Additional research is needed to parse the contributions of R/S to physical health and vice versa.

In summary, the current meta-analysis contributes to the large body of literature on R/S in cancer by confirming that R/S is associated with better patient-reported physical health. This finding underscores the need for the timely and culturally sensitive provision of religious and spiritual support to patients at all stages of the cancer continuum, from diagnosis to end-of-life care. Although few spiritually based interventions have been tested in cancer patients, available data suggest that they may improve quality of life and physical recovery.[39-41] Future studies should focus on understanding the biopsychosocial mechanisms of this relation and performing rigorous evaluations of additional interventions in cancer patients to address R/S needs, enhance resilience, and promote better physical health. Such interventions have the potential to enhance quality of life after a cancer diagnosis, regardless of the disease state.

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CONFLICT OF INTEREST DISCLOSURES

The authors made no disclosures.

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