Interplay between spirituality and religiosity on the physical and mental well-being of cancer survivors

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Abstract

Purpose This study explored the relationship of spirituality and religiosity as it affects the physical and mental quality of life (pQOL, mQOL) of cancer survivors.

Methods This is a prospective observational study that included adults ≥ 19 years who received treatment for various types of cancer. Patients’ QOL was obtained at baseline, 6, and 12 months. Cohorts were categorized according to spirituality/religiosity levels: low spirituality–low religiosity (LSLR), low spirituality–high religiosity (LSHR), high spirituality–low religiosity (HSLR), and high spirituality–high religiosity (HSHR).

Results Of the 551 eligible, 248 (45%) had HSHR, 196 (36%) had LSHR, 75 (14%) had LSLR, and 32 (6%) had HSLR. The pQOL of LSLR were significantly lower than those with HSHR (p = 0.02). The differences in pQOL between LS and HS were observed among those who have HR (p < 0.0001). Among patients with LR, pQOL did not differ. The mQOL of patients with LSLR was significantly lower than those with HSHR (p < 0.0001). The mQOL of those with HS was significantly higher than those with LS in both cohorts having LR (p < 0.0001) or HR (p < 0.0001). pQOL decreased while mQOL increased over time regardless of spirituality or religiosity levels.

Conclusion Spirituality is important in the improvement of both pQOL and mQOL of cancer survivors, while religiosity may have some impact on pQOL. Clinicians’ incorporation of spirituality into cancer treatment facilitates well-rounded care, which offers measurable improvements for patients with an illness, of which the treatment is often arduous, and uncertain.

Keywords Cancer · Oncology · Quality of life · Religiosity · Spirituality · Survivorship

Introduction

The diagnosis, treatment, and survivorship of cancer are life-changing experiences that prompt patients to seek an understanding of not only the medical aspects of cancer but also how cancer will affect their lives. Patients with cancer experience uncertainty about the future, which can provoke psychological distress, manifest as grief over their changing life, negative self-perception, hopelessness, and psychiatric co-morbidities like panic, anxiety, and depression. Cancer-related distress has been associated with declines in patients’ well-being and decreases their physical and mental quality of life (QOL) [1–3].

Spirituality and religiosity positively influence physical and mental health and are commonly employed to cope with life-threatening illness [4–8]. Spirituality and religiosity have different conceptual meanings. The National Cancer Institute defines spirituality as “an individual’s sense of peace, purpose, connection to others, and beliefs about the meaning of life” [9]. Spirituality drives an individual’s search for meaning in life and manifests through connecting with family and friends, nature, art, music, and perhaps a relationship with a deity [10]. A survey of the general population revealed that 76% of respondents claim to have spiritual awareness, but that percentage increases to 85–90%
among cancer survivors, indicating spirituality’s increased salience for cancer survivors [11, 12].

Religiosity can be an expression of spirituality that occurs with specific beliefs and practices [9]. Thus, religiosity may serve as a “nurture and channel for expression” of spirituality [13]. Approximately 84% of Americans report a religious affiliation [14]. Individuals may consider themselves as spiritual, religious, both, or none. While most religious individuals also identify as spiritual, there is an emerging recognition of individuals who identify as spiritual but not religious [15].

Spiritual well-being in cancer survivors correlates positively with quality of life and manifests clinically as decreased anxiety [16], maintaining confidence, and maintaining a fighting spirit [17]. Religiosity has been associated with better physical health, including increased longevity, decreased heart disease, decreased cancer incidence, and lower all-cause mortality [18, 19]. Religiosity has also been linked to increased self-esteem and decreased rates depression and anxiety [7]. Cancer patients tend to have stronger religious ties and desire incorporation of spiritual needs into their healthcare [20, 21]. Despite these findings, medical teams continue to pay very little attention to spiritual or religious needs of patients [21].

This study was conducted to answer the question: do religiosity and spirituality act independently or work synergistically in affecting physical and mental quality of life in a cohort of cancer survivors? Our findings facilitate a deeper understanding of the clinical implications behind the conceptual distinction between spirituality and religiosity.

Methods

Participants

Data were obtained from CANCER CARE, an observational prospective cohort study using a self-administered questionnaire to evaluate follow-up care among cancer survivors seen at the University of Nebraska Medical Center (UNMC) between March 2006 and July 2008. Participants were at least 19 years of age and completed cancer treatment at UNMC. Participants varied in date of diagnosis and completion of last treatment. From a list of 5500 eligible subjects, 2500 were screened randomly. Rural patients and racial/ethnic minorities were oversampled. After excluding deceased patients, the sample was sorted by date of consent, and the first 2000 were invited to participate. Three separate mailings of survey forms were sent before non-respondent status. Survey questionnaires were sent to all participants at three time periods: baseline (August 2008) and two follow-up surveys, 6 months (February 2009) and 12 months (August 2009). Participants were not paid for study participation, but a donation to a charity of their choice was made on their behalf as an altruistic incentive. This study only included subjects who participated in all three time periods (N=551). The study was approved by the Institutional Review Board at UNMC. The cohort and study methods have been described in previous studies [22, 23].

Variables analyzed

Spirituality was measured by the Functional Assessment of Cancer Therapy Spirituality Scale (FACT-SP) at baseline [24]. The cohort was then categorized into low or high spirituality groups, based on the overall median score.

Religiosity was deconstructed into two domains: belief and practice, which were measured using a religiosity scale, used in previous studies [25], that consists of two standard items from the baseline questionnaire. To capture the importance and influence of patients’ religious beliefs, a 9-point Likert scale ranging from “1” (“not at all or have no religion”) to “9” (“extremely, my religious faith influences all that I do”). Based on the calculated score, the groups were categorized into three groups: low influence of religious beliefs (scores 1–3), moderate influence of religious beliefs (scores 4–6), and high influence of religious beliefs (score 7–9). To capture religious practice, the question “on average, how many times per month do you attend any type of religious service?” was employed. Response options ranged from 0 to 7+, and the group was dichotomized into low religious practice (score 0–3) and high religious practice (score >4), based on the median score of four. Belief and practice were combined to create the binary category for low and high religiosity. Those with low religious belief and low religious practice were considered low religiosity, while individuals scoring highly on religious practice or moderate to high on religious belief comprised high religiosity. No respondents with moderate or high religious beliefs had low religious practice.

To evaluate the relationship between spirituality and religiosity on physical quality of life (pQOL) and mental quality of life (mQOL), the cohort was divided into four groups, based on spirituality and religiosity scores: (1) low spirituality, low religiosity (LSLR); (2) low spirituality, high religiosity (LSHR); (3) high spirituality, low religiosity (HSLR); and (4) high spirituality, high religiosity (HSHR). These are the four spirituality/religiosity index (SRI) groups.

The primary outcomes of interest included pQOL and mQOL as measured by the Short-Form-12 Health Survey (SF-12) [26]. This 12-item validated questionnaire is a generic indicator of health status, providing both physical and mental component scores. QOL was measured at baseline, 6 and 12 months from study start. Socio-demographic characteristics, disease, and treatment-related characteristics were also collected and analyzed.
Statistical analysis

Patient, disease, and treatment-related characteristics were compared across the four SRI groups using Kruskal–Wallis test or chi-square test for continuous or categorical data, respectively. To evaluate differences in physical and mental quality of life over time (baseline, 6, and 12 months) between or across cohorts, repeated measures mixed models (repeated on one factor, time-period) was used. Separate models were constructed for physical and mental quality of life. The SRI grouping (e.g., LSLR, LSHR, HSLR, HSHR) and the regularly spaced time-period (baseline, 6, and 12 months) were the two factors examined in a fixed-effect model, using PROC MIXED in SAS for Windows version 9.3, while adjusting for other significant covariates (e.g., age, disease type, time from diagnosis to study start, and time from last treatment to study start). All modeling used autoregressive covariance structure. We performed the following specific comparisons based on questions of interest: (1) a four group comparison evaluated overall group differences; (2) LSLR vs. HSHR evaluated differences in the two extreme groups of spirituality and religiosity, (3) LSLR vs. HSLR evaluated differences in the effect of spirituality among those who have low religiosity; (4) LSHR vs. HSHR evaluated differences in the effect of spirituality among those with high religiosity; (5) LSLR vs. LSHR evaluated differences in the effect of religiosity among those with low spirituality; and (6) HSLR vs. HSHR evaluated differences in the effect of religiosity among those with high spirituality.

Results

Study participation

A detailed description of the cohort used in this study has been described in our previous study [22]. This study included 551 participants who remained alive for at least 1 year and who responded to all three surveys (baseline, 6, and 12 months); 59% of the initial 939 baseline survey completions.

Sample characteristics

Demographic characteristics of the participants are shown in Table 1. Of the 551 study participants, 248 (45%) had high spirituality/high religiosity, 196 (36%) had low spirituality/high religiosity, 75 (14%) had low spirituality/low religiosity, while 32 (6%) had high spirituality/low religiosity. The four cohorts were similar regarding patient, disease, and treatment-related characteristics. Rural participants were more likely to be either spiritual and/or religious than their urban counterparts. Participants who professed a religious faith were more likely to be either spiritual and/or religious compared to those without a religious faith. Participants receiving more complex treatment for their cancer (chemotherapy + surgery + radiation or stem cell transplantation) were more likely to be either spiritual and/or religious than those who received chemotherapy alone.

Relationship of spirituality, religiosity, and QOL

The multivariate analysis evaluating the relationship between SRI group and participants’ physical/mental QOL composite scores is shown in Table 2, which features between-group comparisons, comparisons across the study time period, and a time-by-group interaction comparison among the SRI groupings. These comparisons are shown separately for physical and mental QOL. In all analyses, we failed to detect significant interaction between SRI group type and time period, meaning changes in physical or mental QOL over time are not dependent on one’s level of spirituality or religiosity. However, statistically significant, independent effects of SRI and time on physical and mental QOL were observed, indicating that one’s level of spirituality or religiosity can modulate their pQOL or mQOL.

Physical QOL

The physical QOL of cancer survivors in the LSLR group was significantly lower than those with HSHR \( (p = 0.02, \text{Fig. 1, B pair}) \). The difference in physical QOL between patients with low or high spirituality was not different for patients with low religiosity, though highly religious patients with high spirituality (HSHR) had better pQOL than LSHR patients \( (p < 0.0001, \text{Fig. 1, F pair}) \). This suggests that spirituality may exert a positive influence on the physical well-being of highly religious cancer survivors, though this study did show an overall decrease in pQOL regardless of SRI group.

Mental QOL

The influence of spirituality and religiosity on mQOL is more robust than the influence on pQOL. The mQOL of cancer survivors who have LSLR is significantly lower than those with HSHR \( (p < 0.0001, \text{Fig. 2, B pair}) \). In contrast to pQOL, the mQOL of cancer survivors with high spirituality is significantly higher than those with low spirituality, regardless of the level of religiosity (HSLR-LSLR, \( p < 0.0001, \text{Fig. 2, C pair}) \). HSHR-LSHR, \( p < 0.0001, \text{Fig. 2, F pair}) \). A significant difference in mQOL was not detected when comparing low vs. high religiosity among highly spiritual cancer survivors \( (\text{SHR-HSLR, } p = 0.17, \text{Fig. 2, E pair}) \). We also noted a marginally significant difference in mQOL between LSLR and LSHR \( (p = 0.04, \text{Fig. 2, D pair}) \). This suggests
that spirituality, rather than religiosity, tends to drive the positive effect on the mental well-being of cancer survivors. While an overall decrease in patients’ pQOL over the study period was observed, mQOL of cancer survivors improved over time regardless of their level of spirituality and religiosity. Despite that trend, the benefits of higher spirituality persisted; patients with higher spirituality continued to have higher mQOL scores than those with lower spirituality.
Table 1 (continued)

| Employment status | Low spirituality/low religiosity | Low spirituality/high religiosity | High spirituality/low religiosity | High spirituality/high religiosity | p value |
|-------------------|---------------------------------|----------------------------------|----------------------------------|-----------------------------------|---------|
|                   | N Eval. Frequency (percent)     | Frequency (percent)              | Frequency (percent)              | Frequency (percent)              |         |
| Full time         | 551 43 (57) 117 (60) 21 (66) 142 (57) | 0.39                              |
| Part time         | 4 (5) 18 (9) 4 (13) 27 (11)    |                                   |
| Homemaker         | 11 (15) 14 (7) 4 (13) 22 (9)    |                                   |
| Student           | 2 (3) 1 (1) 0 (0) 4 (2)        |                                   |
| Retired           | 10 (13) 38 (19) 7 (22) 44 (18) |                                   |
| Other             | 5 (7) 8 (4) 0 (0) 9 (4)        |                                   |
| Primary income provider | 551 39 (52) 98 (50) 19 (59) 113 (46) | 0.41                              |
| Insurance         |                                |                                   |                                   |                                   |         |
| Employer based    | 551 41 (55) 108 (55) 23 (72) 130 (52) | 0.46                              |
| Individual based  | 9 (12) 38 (19) 2 (6) 46 (19)    |                                   |
| Medicare/Medicaid | 20 (27) 36 (18) 7 (22) 52 (21)  |                                   |
| Other             | 5 (7) 12 (6) 0 (0) 16 (6)      |                                   |
| None              | 0 (0) 2 (1) 0 (0) 4 (2)        |                                   |
| Prescription insurance | 551 65 (87) 174 (89) 26 (81) 216 (87) | 0.69                              |
| Type of malignancy|                                |                                   |                                   |                                   |         |
| Leukemia, lymphoma, multiple myeloma | 551 31 (41) 105 (54) 17 (53) 130 (52) | 0.35                              |
| Breast, colon, prostate | 29 (39) 72 (37) 11 (34) 89 (36)     |                                   |
| Lung, pancreatic, other | 15 (20) 19 (10) 4 (13) 29 (12)     |                                   |
| Median time to diagnosis in months [range] | 4.8 [0.8–23.6] 4.3 [0.5–26.6] 5 [0.7–14.4] 4 [0.6–26.6] | 0.13                              |
| 1980–1992         | 551 3 (4) 7 (4) 0 (0) 7 (3)     | 0.43                              |
| 1993–1999         | 10 (13) 37 (19) 5 (16) 27 (11)  |                                   |
| 2000–2007         | 59 (79) 148 (76) 27 (84) 207 (83) |                                   |
| Missing           | 3 (4) 4 (2) 0 (0) 7 (3)        |                                   |
| Median time to treatment in months [range] | 3.6 [0.3–23.6] 3.6 [0.1–19.2] 5 [0.6–10.5] 3.3 [0.4–18.7] | 0.41                              |
| 1980–1992         | 551 2 (3) 4 (2) 0 (0) 3 (1)     | 0.87                              |
| 1993–1999         | 8 (11) 24 (12) 2 (6) 23 (9)     |                                   |
| 2000–2007         | 54 (72) 148 (76) 25 (78) 192 (77) |                                   |
| Missing           | 11 (15) 20 (10) 5 (16) 30 (12)  |                                   |
| Affiliation of follow-up provider |                                |                                   |                                   |                                   |         |
| University-based  | 551 62 (83) 131 (67) 23 (72) 167 (67) | 0.13                              |
| Community-based   | 6 (8) 22 (11) 4 (13) 27 (11)    |                                   |
| Both              | 7 (9) 43 (22) 5 (16) 49 (20)    |                                   |
| Missing           | 0 (0) 0 (0) 0 (0) 5 (2)        |                                   |
| Treatment received |                                |                                   |                                   |                                   |         |
| Chemotherapy only | 551 17 (23) 65 (33) 5 (16) 84 (34) | 0.01                              |
| Chemo + surgery + radiation | 47 (63) 78 (40) 19 (59) 107 (43) |                                   |
| Stem cell transplant | 11 (15) 53 (27) 8 (25) 57 (23)     |                                   |
| Prior treatment outside university | 551 29 (39) 87 (44) 10 (31) 116 (47) | 0.29                              |
Table 2  Multivariate analysis evaluating association between spirituality/religiosity and quality of life over time

| Spirituality – Religiosity Groupings | Physical composite score \(^a\) | Mental composite score \(^a\) |
|-------------------------------------|----------------------------------|-------------------------------|
|                                     | Between group | Time | Group*time interaction | Between group | Time | Group*time interaction |
| A. Low spirituality/low religiosity vs Low spirituality/high religiosity vs High spirituality/low religiosity vs High spirituality/high religiosity |               |      |                        |               |      |                        |
| B. Low spirituality/low religiosity vs High spirituality/high religiosity | 0.02           | 0.04 | 0.98                   |               |      |                        |
| C. Low spirituality/low religiosity vs High spirituality/low religiosity | 0.40           | 0.19 | 0.91                   |               |      |                        |
| D. Low spirituality/low religiosity vs High spirituality/high religiosity | 0.09           | 0.08 | 0.69                   | 0.04          |      | <0.0001               |
| E. High spirituality/low religiosity vs High spirituality/high religiosity | 0.79           | 0.08 | 0.94                   | 0.17          |      | 0.003                 |
| F. Low spirituality/high religiosity vs High spirituality/high religiosity | <0.0001        | 0.001| 0.60                   | <0.0001       |      | <0.0001               |

Legend: \(^a\) Model adjusted for other significant covariates: age at time of study, type of disease, time from diagnosis to study enrolment, and time from last treatment to study start.

Fig. 1  Physical health composite scores. Physical well-being (as measured by SF-12) according to level of spirituality—religiosity index.
Discussion

Our study explored the interplay between spirituality and religiosity as it relates to the physical and mental well-being of cancer survivors. Our study showed that higher spirituality had an impact on the physical well-being of highly religious survivors. Conversely, spirituality alone improves the mental well-being of survivors, regardless of religiosity level. While our results are consistent with findings from other authors [4–7, 16, 27], our study further elucidated the interplay between spirituality/religiosity as it affects QOL by evaluating the influence of spirituality and religiosity over time in a large sample.

Kristeller et al. explored the spiritual and religious influences on the adjustment to cancer diagnosis with the same four groups presented in our study. The breakdown of their cohort (n = 114) consisted of HSHR (45%), HSLR (25%), negative religious coper (termed LSHR in our study) (14%), and LSLR (16%) [27]. Although our LSLR cluster was smaller (6%), this difference is likely due to the definition of religiosity. Therefore, the scheme classifying patients in this study is validated given the similarities between our study and the Kristeller study.

The mQOL of cancer survivors increased over the 12-month study period, with highly spiritual individuals registering higher baseline mQOL scores. Spirituality appears to facilitate patients’ adjustment to coping with serious illness. Vallurupalli studied 69 patients with advanced cancer receiving palliative radiation and found that religiosity and spirituality both had significant positive associations with patients’ QOL, with spirituality demonstrating a more robust association [28]. Spirituality has been associated with cancer patients continuing to enjoy life despite high levels of pain or fatigue [29]. Highly spiritual individuals possess an intrinsic mental framework through which they process their illness, leading to positive adaptation and increased ability to thrive over time. While patients with lower levels of spirituality are able to live with and survive severe illness, their awareness or ability to ascribe purpose and find peace is less advanced, explaining their lower overall mQOL scores as well as smaller improvements in mQOL over time.
We observed that pQOL decreased over time for all SRI groups. Cancer has well known associations with long-term sequelae that adversely impact functional status, including the development of infections, second malignancies, cardiovascular disease, diabetes, osteoporosis, and functional decline [30]. As physical health deteriorates, spirituality plays a significant role in mitigating, but not preventing, the decline in pQOL caused by the health implications of cancer. However, spirituality’s effect on pQOL was only significant among highly religious participants (HSHR vs. LSHR). Our definition of religiosity that includes both belief and practice or attendance, likely required participants to have a level of mobility and independence to fit our definition of ‘highly religious’. However, within the group of highly religious patients, the less pronounced decline of pQOL for highly spiritual patients, compared to low spirituality patients, might also be explained by the highly spiritual patients’ meaning-filled belonging in a faith community that simultaneously modulates their spirituality and involves them in a religious community, whose means of providing social support like transportation, or assistance in meal preparation, can circumvent the cancer-provoked decline in pQOL. These benefits may be unavailable to individuals who are spiritual, but not religious. As a corollary, individuals who are highly religious but not spiritual may view religion as devoid of meaning and therefore do not pursue resources within that community that could otherwise augment pQOL.

Medical illness may strengthen spiritual resolve; however, illness can also shake an individual’s spiritual assumptions [31]. Our finding of spirituality showing a greater positive relationship with mQOL, regardless of religiosity level, prompts consideration of whether religiosity has any impact on mQOL of cancer patients. Stressful situations, like illness, can be an opportunity for religious growth, facilitating an understanding of the implications of illness as well as improving mQOL through reappraising religious belief, reminding patients of their relationship with a loving God. However, religious belief may also interpret medical illness as a form of punishment. This type of belief adds stress for patients struggling to cope with cancer, worsening mQOL. Seeking an understanding of medical illnesses’ meanings may prompt existential questions of a spiritual and religious nature evaluating personal values and beliefs, the nature of an individual’s relationship with God, and the individual’s role in the religious community. These intimate and fragile questions, if not adequately dealt with, have been associated with consequences, such as depression, anxiety, and other forms of psychological distress [32]. A study by Wikelman hypothesized that spiritual struggles might lead to poor QOL due to the lack of spiritual peace implied by such struggles [33]. Being at peace with God and being free from pain ranked highest in importance by patients in end-of-life care. This suggests that a framework for expedient navigation and resolution of the existential questions posed by severe illness would be embraced by patients [34]. Our results show that interventions fostering an individual’s spirituality may improve mQOL because the distress associated with existential questioning is more adeptly navigated through an internally generated interpretive framework salient for each individual.

Being highly religious does not necessarily foster this interpretive framework. Kristeller, et al. showed that LSHR individuals (termed negative religious copers in their study) had the highest prevalence of depressed mood of the four SRI groups, despite high levels of positive religious involvement. It was hypothesized that this group internalizes their struggle of coping with cancer. LSHR individuals acknowledge their engagement with a religion but cannot translate a connection to God into solace during their illness [27]. This finding supports our claim that spirituality, and not religiosity, is the most important determinant of mQOL in cancer patients. Highly religious but spiritually impoverished individuals are unable to find meaningful connections and therefore rely on religion, an external superimposition of belief and practice as an attempt to ameliorate their poor QOL. Low mQOL may be further compounded by a how a particular religious sect interprets severe illness, especially if illness is retribution for a moral failing.

Distinguishing spirituality from religiosity on clinical outcomes, such as QOL, can also inform physicians on how to best communicate with patients about existential questions posed by illness. Surveys have shown that most patients with advanced illness desire the incorporation of spirituality into their medical care, though this occurs infrequently in cancer patients’ care [21, 35, 36]. This might be due to medical teams’ perceived inability to handle spiritual concerns, perceived lack of time, insufficient training, or the dismissal of spiritual/religious needs as valid health determinants [37–39]. The objective of discussing spirituality is to provide a venue for the incorporation of spiritual/religious beliefs, practices, and concerns into the overall scheme of care. This topic can be approached by asking: “Spirituality often influences how people deal with illness. How, if at all, has your spirituality influenced how you have dealt with your medical condition?” [31]. This open-ended query allows freer communication about beliefs, giving the clinician a sense of the overall effect of illness on the patient, and whether the patient could benefit from interventions aimed at enhancing spiritual awareness. Kristeller identified four types of patients with different spiritual/religious needs enabling physicians to better focus their inquiries when talking to patients: highly religious/spiritual, spiritual but less religious, religiously distressed, and religiously/spiritually distressed. This classification enables better identification of needs and leads to provision or referral for more tailored, useful, and effective interventions [27]. The prominent
influence of spirituality over religiosity on QOL assures clinicians who are conflicted about the role of religion in medical care, that initiating dialogue about spiritual beliefs is not a religious endorsement and has measurable clinical benefit. Therefore, the incorporation of spirituality leads to more complete medical care with genuine and measurable improvements in QOL for patients [40, 41].

This growing recognition has led to the development of instruments to assess spiritual need, and professional associations, including the NCCN, the American Society of Clinical Oncology, the European Association for Palliative Care, and NICE now recommend the inclusion of assessment and addressing spiritual need as essential components of comprehensive care. Our findings add additional evidence for the importance of including the assessment and addressing of spiritual needs as essential components of comprehensive care [9, 40, 42–46].

Our study has several strengths and weaknesses. Strengths include a large number of respondents who were followed for 12 months. Also, our study measured spirituality and religiosity, with validated instruments/questions used in previous studies. The outcome, QOL, was measured repeatedly and concurrently on all study participants. While our sample consisted of participants representing a diverse range of what is broadly defined as cancer survivors, the sample was predominantly Caucasian.

One of our study’s major limitations is the preponderance of Christian participants (84%). This may have decreased the observed differences between low and high spirituality among those who had low religiosity. Homogeneity reduces the generalizability of our findings to other religions, particularly non-theocentric religions. In addition to the heterogeneity of religious belief systems, religious experience can be heterogeneous among individuals within a particular religion. Future studies should include a more diverse array of religious belief to improve the understanding of the heterogeneity of religious experience, its impact on QOL, and whether theocentrism has any impact on the separateness of spirituality and religiosity. Another limitation is that percentages of those identifying as religious has continued to decline since this study was conducted, which may impede replicability of our findings.

Our study adds to the body of evidence that spirituality, as a construct separate from religion, has a role in the care of cancer survivors imparting significant improvements in mQOL. A decline in pQOL was observed across all SRI groups, though religiosity, in concert with spirituality appeared to blunt this decline, rendering both religiosity and spirituality as important components in slowing physical decline in cancer. Our findings support the inclusion of inquiries aimed at understanding the role of spirituality and religiosity in patients’ lives, and should not be overlooked when planning cancer treatment. By incorporating a recognition of the spiritual/religious needs patients, the far-reaching implications of cancer come into clearer focus, and clinicians have a broader menu from which to choose meaningful and tailored interventions to ameliorate distress, generate meaning, and improve quality of life.

Author contribution Anthony Cannon: Manuscript writing and editing, data analysis, literature review. Mehmet Dokucu: Manuscript edits, data analysis. Fausto Loberiza: Data analysis, study design, methodology.

Data availability N/A.

Code availability Data were analyzed using SAS v9.4, code is available.

Declarations

Ethics approval This study was approved by the Institutional Review Board at the University of Nebraska Medical Center.

Consent to participate Informed consent was obtained from all individual participants included in the study.

Consent to publish Each participant has consented to the responses of their questionnaires being used in the production of data and being published in aggregate.

Conflict of interest One author, Dr. Loberiza, is now employed by Pfizer. The authors declare no competing interests.

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