

# Examining the mediating role of cancer-related problems on spirituality and self-rated health among African American cancer survivors: a report from the American Cancer Society's Studies of Cancer Survivors-II

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## Abstract

**Objective:** African American (AA) cancer survivors report poorer self-rated health (SRH) compared to other racial/ethnic groups. Spirituality is often linked to positive health outcomes, with AAs reporting greater levels of spirituality. This study examined the potential mediating role of cancer-related problems in the relationship between spirituality and SRH among AA cancer survivors compared to non-African American (non-AA) survivors.

**Methods:** We analyzed data on 9006 adult cancer survivors from the American Cancer Society's Study of Cancer Survivors-II. Preliminary analyses compared characteristics of AAs and non-AAs and identified significant covariates of SRH. We tested a path model using multi-group structural equation modeling (SEM), and then examined race as a moderator.

**Results:** Of the three domains of spirituality assessed, AAs had higher levels of *peace* ( $p < .001$ ) and *faith* ( $p < .001$ ), but not *meaning*, compared to non-AAs; and of four domains of cancer-related problems assessed, AAs had greater *physical distress* ( $p < .001$ ), *emotional distress* ( $p < .001$ ), and *employment/finance problems* ( $p < .001$ ), but not *fear of recurrence*. In SEM analyses adjusting for number of comorbidities and income, race moderated the impact of spirituality and cancer-related problems on SRH. Specifically, spirituality had significantly stronger associations with cancer-related problems among AAs than non-AAs. Spirituality was positively associated with all four domains of cancer-related problems, but only physical distress was associated with SRH among AAs.

**Conclusions:** The negative effects of physical distress may attenuate the positive effects of spirituality on AA's SRH. Future studies should consider racial/ethnic differences in the determinants and conceptualization of SRH, which is a known predictor of survival.

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## Introduction

Self-rated health (SRH) is a frequently used measure of overall health status [1] and has been a consistent predictor of overall mortality [2] as well as cancer survival [3,4]. For example, Shadbolt et al. (2002) found that among patients with advanced cancer, SRH predicted survival far better than many clinical indicators, appetite loss, fatigue, and health-related quality of life measures [4]. Previous studies have shown socio-demographic and cultural differences in SRH. Specifically, African Americans tend to report poorer SRH compared to other racial/ethnic groups, even with similar objective health status [5,6]. Additionally, among older adults [7], African American cancer survivors report disproportionately poorer SRH compared to other racial/ethnic groups [5–8].

SRH has been positively associated with spirituality, which is most often operationalized as an intrapersonal

belief in a higher power [9]. Despite lower levels of SRH, African American cancer survivors report higher levels of spirituality than survivors of other racial/ethnic groups [8–10]. Canada et al. (2012) found that, after adjusting for important socio-demographic and medical factors, African Americans still reported higher levels of spiritual well-being compared to non-Hispanic White and Hispanic cancer survivors [8]. Studies suggest that approximately 70–90% of individuals diagnosed with cancer report that spirituality is important in coping with their diagnosis and/or treatment [11,12]. Using National Health Interview Survey data, Ross et al. (2008) found that 68.5% of adult cancer survivors reported praying for their health, with African American survivors being most likely to report praying for their health (80.1%) [10]. Spirituality is predictive of positive psychosocial outcomes including better coping, psychosocial adjustment to a

cancer diagnosis [13], and positive behavior change after cancer diagnosis [14]. To our knowledge, research to explain the discrepant association between spirituality and SRH among African Americans is lacking.

Although spirituality has been associated with better psychosocial outcomes, other factors may attenuate the positive effects of spirituality on SRH, resulting in more negative self-assessments of health among African Americans. Cancer-related problems may be one such factor. Evidence suggests that racial/ethnic minority cancer survivors experience more problems related to physical distress and employment/finance issues compared to non-Hispanic White cancer survivors [15]. This may be due to well-documented disparities in socioeconomic status [16] and inequitable patterns in cancer treatment [17–19].

### Study aims and hypothesis

The present study aimed to: (a) examine the extent to which spirituality is associated with SRH among African American cancer survivors compared to other racial/ethnic groups; and (b) examine the extent to which cancer-related problems mediate the relationship between spirituality and SRH. To our knowledge, this is the first study to test these associations among a large, population-based cohort of survivors of multiple cancer types. Thus, increased statistical power provides the opportunity to detect associations among multiple predictors on SRH. This study may help explain underlying racial and ethnic differences in the processes by which spirituality and cancer-related problems are associated with perceived health status among cancer survivors. We hypothesized that the associations among spirituality, cancer-related problems, and SRH would differ between African American and non-African American cancer survivors. Specifically, we hypothesized that greater cancer-related problems experienced by African Americans would attenuate the positive effects of spirituality on their SRH. The value in comparing African Americans and non-African Americans in this study is that it provides an opportunity to examine potential mediators that could help explain the disparity in SRH between African Americans and non-African Americans.

### Methods

We conducted a secondary data analysis of the American Cancer Society's Study of Cancer Survivors-II (SCS-II), a national, cross-sectional survey of psychosocial adjustment and quality of life among cancer survivors [19]. Eligibility criteria for SCS-II included the following: (a) a cancer diagnosis either 2, 5, or 10 years prior to the time of sampling; (b) diagnosis of one of the six highly incident cancers (i.e. prostate, female breast, colorectal, bladder,

skin melanoma, or uterine); (c) stage I–IV cancer; (d) age 18 years or older at the time of diagnosis; (e) residence in one of SCS-II's target states at the time of diagnosis; and (f) ability to read and write English or Spanish. Cancer survivors were identified and recruited through the participation of 14 state cancer registries. Additional details about SCS-II are described elsewhere [20].

A total of 9170 survivors agreed to participate in the study and completed the questionnaire. For the current study, data from 164 survivors were excluded because race was unknown, leaving an analytic sample of 9006 survivors. Approval for this study was obtained from the Institutional Review Board of Emory University. Additional approval was obtained from each of the 14 state cancer registries used to recruit SCS-II participants.

### Measures

#### Self-rated health

The primary outcome in this study, self-rated health (SRH), was measured using the standard single item, 'In general, would you say your health is: Excellent, Very Good, Good, Fair, or Poor?' [21] The distribution of responses allowed us to analyze SRH as a continuous variable, with higher scores indicating greater SRH.

#### Cancer-related problems

The potential moderator in this study, cancer-related problems, was assessed using the Cancer Problems in Living Scale (CPILS), a multi-dimensional measure developed to assess a range of issues specific to cancer survivors [15]. The version of CPILS used in SCS-II included 31 statements identifying problems commonly experienced by individuals diagnosed with cancer, which were divided into four subscales: physical distress (10 items), emotional distress (10 items), employment and finance problems (6 items), and fear of recurrence (4 items) [22]. Participants were asked to indicate how much of a problem each listed item had been in the past 12 months. Sample items include: fatigue/loss of strength, eating difficulties, sleep difficulties, continued major problems with my health (physical distress); guilt feelings, feeling angry, feeling helpless, feeling vulnerable (emotional distress); difficulty meeting medical expenses, being less able to provide for the financial needs of my family, difficulties in pursuing the career of my choice (Employment/finance problems); concern about relapsing, fears about the future, and feeling fearful that my illness will return (fear of recurrence). Response options included: 0 = not a problem for me, 1 = somewhat of a problem for me, and 2 = a severe problem for me. Subscales were scored by summing item responses to reflect a continuum from none to severe problems.

## Spirituality

The primary predictor in this study, spirituality, was assessed using the Functional Assessment of Chronic Illness Therapy-Spiritual Well-Being Scale (FACIT-Sp). The FACIT-Sp is a 12-item measure of spiritual well-being for individuals with chronic disease that has been used frequently in cancer research [23]. Canada et al. (2008) conducted a factor analysis and demonstrated a three-factor solution to the FACIT-Sp where meaning and peace are divided into two separate subscales [8]. We used this three-factor version of the FACIT-Sp. The three subscales in this version include *meaning* (4 items), *peace* (4 items), and *faith* (4 items). Meaning assesses feelings of inner comfort, and sample items include: I have a reason for living; and I feel a sense of purpose in my life. The peace subscale measures individuals' inner comfort and sample items include: I feel peaceful; and I feel a sense of harmony within myself. The faith subscale of the FACIT-Sp measures the relationship between one's illness and his or her spiritual beliefs. Sample items from the faith subscale include: I find comfort in my faith or spiritual beliefs; and My illness has strengthened my faith or spiritual beliefs. We also examined an additional item about faith from the ACS SCS-II survey, 'My faith or spirituality has helped me through my cancer experience.' Participants were asked the extent to which each item has been true in the past 7 days, with response categories ranging from 0 (not at all) to 4 (very much).

## Demographic and health-related variables

The SCS-II survey instrument captured demographic information including participants' education level (8<sup>th</sup> grade or less, some high school, high school diploma or GED, vocational school or some college, college graduate, professional or graduate school experience), household income (less than \$5 K, \$5 K–\$9999 K, \$10 K–\$19,999, \$20–29,999 K, \$30 K–\$39,999, \$40–74,999 K, \$75 K or more, prefer not to answer), marital status (married, living in a marriage-like relationship, divorced, separated, widowed, or single/never married), and race/ethnicity (African American/Black, American Indian/Aleut/Eskimo, Asian/Pacific Islander, Caucasian/White, multi-racial, or other). Health-related information obtained from the survey included health insurance status (insured/uninsured), and total number of co-morbidities. Comorbidities were assessed using the following item: Are you currently being treated for any medical conditions other than cancer? Response options included 'No' or 'Yes' and 'If yes, mark all that apply.' There were 16 chronic diseases to choose from, including arthritis, diabetes, depression, high blood pressure, circulatory problems, osteoporosis, etc. The item also includes a response option for 'Other,' in which respondents could specify additional conditions. Based on responses, a variable was created representing total number of

comorbidities. Unfortunately, data regarding comorbidities prior to cancer diagnosis were not available; therefore whether or not comorbidities were late effects of treatment could not be determined. Gender, age, cancer type, time since diagnosis (2, 5, or 10 years), and cancer stage at diagnosis (in situ, localized, regional, or distant) were obtained from state cancer registry data.

## Statistical analyses

Preliminary data cleaning, re-coding, and bivariate analyses were conducted in SPSS, Version 20. Specifically, SRH was reverse coded so that higher scores represented higher levels of perceived health and then treated as a continuous variable. All categorical variables were re-coded into fewer categories to attain adequate cell sizes for statistical analysis. Chi-square tests (for categorical variables) and *t*-tests (for continuous variables) were conducted to assess differences in demographic, health-related, and spirituality variables by race/ethnicity. Before construction of the path model, all demographic and health-related variables were examined as potential covariates of SRH. Significant correlates of SRH were further examined in the final path model. Additionally, time since diagnosis and stage at diagnosis were added to the final model as covariates of cancer-related problems. Finally, bivariate correlations were conducted to assess associations among predictor variables included in the final model.

We tested a path model using structural equation modeling (SEM) to examine the direct and indirect effects of spirituality and cancer-related problems on SRH. The initial model included all possible structural paths among the three domains of spirituality, the four domains of cancer-related problems, and SRH. This initial model also included all potential demographic and health-related covariates of SRH. For our initial test of this model, we analyzed a random subsample of 300 survivors from each race/ethnic group of interest (African Americans and non-African Americans) who had complete data. A subsample was analyzed first to reduce the chance for finding statistical differences between groups that were not meaningful or practical due to the large sample size ( $N=9006$ ) [24].

To examine racial differences in the process by which spirituality and cancer-related problems are associated with SRH, we first tested the saturated model using the African American subsample only. Non-significant paths and covariances were deleted from the model one at a time. We used the maximum likelihood estimation method and multiple fit indices to evaluate overall model fit including the comparative fit index (CFI) and Root Mean Square Error of Approximation (RMSEA). CFI values between 0.90 and 0.95 or above suggest adequate to good fit [2,3] and RMSEA values  $< .06$  suggest good model fit [25]. Modification indices were consulted for potential improvements in model fit. The final structural

model that provided good fit to the African American subsample was fit to the non-African American subsample, and then the two-group model was repeated with the full sample of 9006.

Next, moderator analyses were conducted with multiple group comparisons to test for statistically significant differences in path estimates across the two groups. Specifically, to assess moderation, we constrained structural paths to be equal across the two racial groups and constrained non-significant paths to zero. A significant deterioration in model fit (i.e. a significant difference in chi-square values) indicates moderation is present. For these moderation analyses with the full sample, we used the maximum likelihood estimation method with full information maximum likelihood (FIML). Path analyses using FIML can accommodate missing data in the predictors and outcomes and do not require listwise deletion. FIML is the recommended estimation method when data are missing at random, and may be less biased than other multivariate approaches when missing data are non-ignorable [26,27].

Last, we conducted mediation analyses to assess the indirect effect of spirituality on SRH. A statistically significant indirect effect indicates the primary predictor works through a secondary predictor to change the outcome (i.e. mediation). Mediation was assessed using MacKinnon et al.'s recommended asymmetric confidence intervals, [28] which may provide more statistical power than Sobel's Delta method [29]. Statistical significance is indicated when the confidence intervals do not include zero. All SEM analyses were conducted using AMOS version 20.

## Results

### Descriptive and bivariate analyses

Demographic and health-related characteristics of the sample population are reported in Table 1, along with differences between African American and non-African American groups. Overall, 10.4% of survivors were African American ( $n=933$ ) and 89.6% were non-African American ( $n=8073$ ). Of the non-African American survivors, 86.5% were non-Hispanic White, 8.2% were Hispanic, and approximately 5.3% reported being either multi-racial or from one of over 20 other racial/ethnic categories. Survivors ranged in age from 23 to 100 years with a mean age of 67.3 ( $SD=11.9$ ). More non-African American survivors were married, had higher incomes, and had more years of education compared with African Americans (Table 1). African Americans had more comorbidities and poorer SRH compared to non-Hispanic White survivors, but there were no significant group differences for cancer stage and time since diagnosis. Non-African American survivors were significantly more likely to have

a diagnosis of skin melanoma compared to African Americans. African Americans had higher mean values on three of the four domains of cancer-related problems compared to non-African Americans. Finally, African American survivors scored significantly higher on the peace and faith domains of the spiritual well-being scale.

### Development of the path model

With the randomly selected subsample of 300 African American cancer survivors, we tested the saturated model in which covariates were allowed to correlate SRH. Significant correlates of SRH (which only included number of comorbidities and income level) were retained in this model. No other covariates (including age, cancer stage, and time since diagnosis) were significantly related to SRH; however, cancer stage and time since diagnosis were included in the final model due to their association with cancer-related problems. The final path model that provided good fit to the data from the African American subsample ( $\chi^2 (df=14)=21.75$ ,  $p=.084$ , CFI=.995, RMSEA=.043, 90% CI [.000, .076]) also provided adequate fit to the non-African American subsample ( $\chi^2 (df=14)=32.74$ ,  $p=.003$ , CFI=.981, RMSEA=.067, 90% CI [.037, .097]).

### Final structural model

Time since diagnosis and stage at diagnosis were added to the final model as covariates of each of the cancer-related problems. The final model (Figure 1) using the full sample of 9006 yielded adequate fit to the data in both groups: African American group,  $\chi^2 (df=18, n=933)=36.98$ ,  $p=.005$ , CFI=.995, RMSEA=.034, 90% CI [.018, .049]; non-African American group,  $\chi^2 (df=18, n=8073)=245.16$ ,  $p<.001$ , CFI=.992, RMSEA=.040, 90% CI [.035, .044]. Significant correlations between variables in the final model are not shown in Figure 1, but are instead presented in Table 2. Controlling for the effect of covariates and inter-correlations between predictors, the meaning domain of spirituality, and physical and emotional distress domains of cancer-related problems had significant effects on self-rated health (Table 3). The path between emotional distress and SRH was not significant in the African American group, while the paths from meaning and physical distress to SRH were invariant across racial groups. That is, meaning and physical distress were associated with SRH for African Americans and non-African Americans.

### Moderation analyses

Testing race as a potential moderator, the two-group model yielded adequate fit to the data:  $\chi^2 (df=52, n=9006)=761.47$ ,  $p<.001$ , CFI=.978, RMSEA=.039, 90% CI [.037, .041]. Constraining all paths to be equal

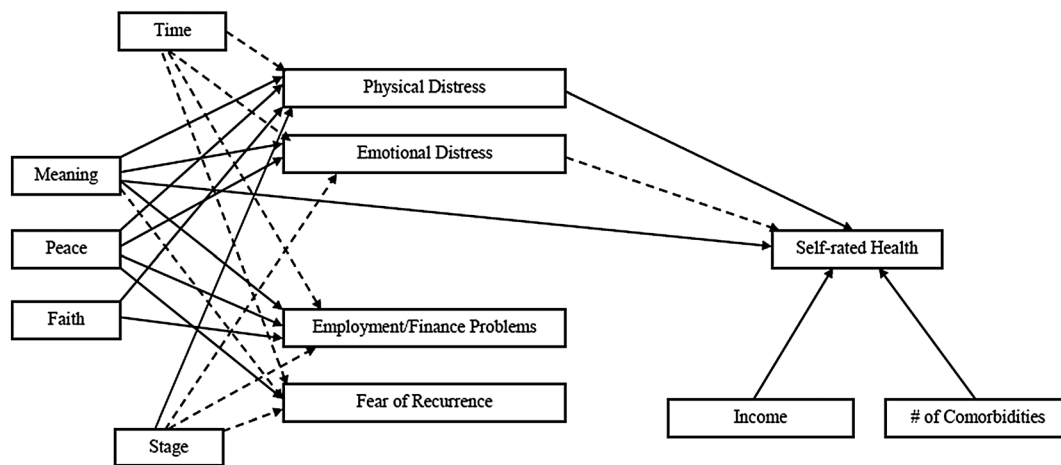
**Table 1.** Sample characteristics

Characteristic	Total sample N = 9006	African American n = 933	Non-African American n = 8073	p-value
	N (%) or M(SD)	n (%) or M(SD)	n (%) or M(SD)	
<i>Demographic variables</i>				
Age (years)	67.3 (11.9)	65.6 (11.4)	67.4 (11.9)	<0.001
Female	5073 (55)	538 (58)	4457 (55)	0.082
Married/partnered	6401 (70)	489 (53)	5875 (73)	<0.001
Income				
< \$20,000	1359 (15)	225 (31)	1116 (17)	<0.001
\$20,000–\$39,999	2416 (26)	212 (29)	2189 (33)	
\$40,000–74,999	2115 (23)	185 (25)	1926 (29)	
≥\$75,000	1461 (16)	114 (16)	1345 (21)	
Education				
< 12 years	1159 (12.6)	203 (23)	934 (12)	<0.001
HS	2230 (24.3)	196 (23)	2021 (26)	
≥ 12 years	5260 (57.4)	470 (54)	4770 (62)	
<i>Health-related variables</i>				
Has health insurance	8933 (98)	893 (96)	7879 (98)	<0.001
Cancer type				<0.001
Breast	2841 (31.5)	353 (37.8)	2488 (30.8)	
Prostate	2182 (24.2)	275 (29.5)	1907 (23.6)	
Colorectal	1874 (20.8)	197 (21.1)	1677 (20.8)	
Bladder	574 (6.4)	49 (5.3)	525 (6.5)	
Uterine	717 (8.0)	56 (6.0)	661 (8.2)	
NHL*	64 (0.7)	3 (0.3)	61 (0.8)	
Skin	754 (8.4)	0 (0)	754 (9.3)	
Stage at diagnosis				
In situ	251 (3)	19 (2)	227 (3)	0.132
Localized	6402 (70)	631 (68)	5653 (70)	
Regional	2335 (26)	262 (28)	2036 (25)	
Distant	182 (2)	21 (2)	157 (2)	
Time since diagnosis				
2 years	3229 (35)	339 (36)	2846 (35)	0.764
5 years	3270 (36)	331 (36)	2875 (36)	
10 years	2671 (29)	263 (28)	2352 (29)	
Comorbidities	1.9 (1.8)	2.3 (1.9)	1.8 (1.7)	<0.001
Self-rated HealthCancer Problems inLiving Scale	3.4 (0.9)	3.1 (0.95)	3.4 (0.92)	<0.001
Physical distress	2.56 (2.42)	2.88 (2.77)	2.53 (2.37)	0.003
Emotional distress	1.36 (2.09)	1.66 (2.42)	1.53 (2.05)	<0.001
Employment andfinance problems	0.71 (1.30)	1.09 (1.63)	0.67 (1.25)	<0.001
Fear of recurrence	1.30 (1.40)	1.35 (1.45)	1.30 (1.39)	0.329
<i>Spirituality variables</i> Spiritual well-being				
Meaning	13.7 (2.8)	13.8 (2.8)	13.7 (2.8)	0.232
Peace	12.0 (3.4)	12.5 (3.4)	11.9 (3.4)	<0.001
Faith	11.7 (4.4)	13.8 (3.3)	11.5 (4.4)	<0.001

Notes: Due to missing data, the percentages may not add up to 100 percent; SRH—scale score ranges from 1–5 with 1 being poor and 5 being excellent; Cancer Problems in Living Scale—total number of cancer-related problems; spiritual well-being—scale scores range from 0 to 16  
\*NHL = Non-Hodgkin lymphoma

across groups significantly decreased model fit, indicating moderation by race. SEM results are listed in Table 3. Meaning was negatively associated with all four domains of cancer-related problems and positively associated with SRH for African Americans. However, meaning was only associated with three of the four domains of cancer-related problems for non-African Americans, with the path between meaning and fear of recurrence being non-significant. Although peace was negatively associated with all four domains of cancer-related problems for both groups, there

were significantly stronger negative associations between peace and physical distress, peace and emotional distress, and peace and employment and finance problems for African Americans. Faith was positively associated with physical distress and employment/finance problems for both groups; however, there was a significantly stronger positive association between faith and employment and finance problems for African Americans. Physical distress was negatively associated with SRH for both groups, while emotional distress was only associated with



Notes: Dotted lines indicate the path was significant in one group but not the other. For correlations, coefficients, and *p*-values, see Tables 2 and 3.

**Figure 1.** Final path model describing associations among spirituality, cancer-related problems, and self-rated health, adjusting for co-variables

**Table 2.** Significant correlations between independent variables and covariates for African Americans and non-African Americans (in parenthesis) from the final path model

Variable	1	2	3	4	5	6	7	8	9
1. FACIT-Sp Meaning	–								
2. FACIT-Sp Peace	.69(.69)	–							
3. FACIT-Sp Faith	.41(.41)	.41(.44)	–						
4. CPILS PD				–					
5. CPILS ED				.64(.54)	–				
6. CPILS EFP				.46(.38)	.45(.43)	–			
7. CPILS FR				.58(.47)	.54(.43)	.35(.35)	–		
8. Income	.27(.24)	.23(.17)				–.16(–.12)		–	
9. # of co-morbidities	–.28(–.25)	–.33(–.27)		.18(.19)				–.19(–.22)	–

Note: FACIT-Sp = Functional Assessment of Chronic Illness Therapy-Spirituality; CPILS = Cancer Problems in Living Scale; PD = Physical Distress; ED = Emotional Distress; EFP = Employment and Finance Problems; FR = Fear of Recurrence

SRH for non-African Americans. Income level was positively associated with SRH, and number of co-morbid conditions was negatively associated with SRH for both groups. Time since diagnosis was not significantly associated with any domains of cancer-related problems for African American survivors; however, time since diagnosis was negatively associated with all domains of cancer-related for non-African Americans. Finally, stage at diagnosis was positively associated with physical distress for African Americans, and positively associated with all domains of cancer-related problems for non-African Americans.

### Mediation analyses

Mediation analyses revealed that the association between spirituality and SRH was mediated by physical distress for both groups. Additionally, the associations between *meaning* and SRH, and *peace* and SRH were mediated by emotional distress for both groups.

### Discussion

The overall aim of this study was to help explain the discordance in the association between spirituality and SRH among African American cancer survivors by examining the mediating role of cancer-related problems. Although the study found spirituality to be positively associated with cancer-related problems, findings suggest physical distress attenuates the positive effects of spirituality on SRH for African American survivors. Further, physical distress may act as a mediator in the relationship between spirituality and SRH; therefore, SRH could have been worse among African Americans if not for the positive effects of spirituality on physical distress. Time since diagnosis and stage at diagnosis were added to the final path model as a way of controlling for their effects on cancer-related problems. By doing this, we were able to demonstrate that neither cancer stage nor time since diagnosis was driving disparities in cancer-related problems

**Table 3.** Results from the final path model comparing African American survivors to Non-African American survivors (N = 9006)

Structural paths	Group	p-value for path significance	Unstandardized β	SE	Standardized β	p-value for group difference
Meaning → physical distress	AA	.001	-.013	.004	-.128	.754
	Non-AA	<.001	-.014	.001	-.174	
Meaning → emotional distress	AA	<.001	-.016	.003	-.181	.902
	Non-AA	<.001	-.016	.001	-.219	
Meaning → employment/finance problems	AA	<.001	-.015	.004	-.145	.178
	Non-AA	<.001	-.009	.001	-.117	
Meaning → fear of recurrence	AA	.001	-.018	.005	-.134	.002
	Non-AA	.729	-.001	.002	-.005	
Meaning → self-rated health	AA	<.001	.049	.011	.146	.564
	Non-AA	<.001	.056	.003	.174	
Peace → physical distress	AA	<.001	-.038	.003	-.472	<.001
	Non-AA	<.001	-.026	.001	-.380	
Peace → emotional distress	AA	<.001	-.032	.003	-.451	<.001
	Non-AA	<.001	-.022	.001	-.367	
Peace → employment/finance problems	AA	<.001	-.026	.004	-.314	.003
	Non-AA	<.001	-.015	.001	-.236	
Peace → fear of recurrence	AA	<.001	-.040	.004	-.378	.907
	Non-AA	<.001	-.041	.001	-.399	
Faith → physical distress	AA	.004	.005	.002	.064	.373
	Non-AA	<.001	.004	.000	.069	
Faith → employment/finance problems	AA	.001	.008	.003	.097	.013
	Non-AA	.001	.002	.001	.035	
Physical distress → self-rated health	AA	<.001	-1.184	.147	-.347	.613
	Non-AA	<.001	-1.264	.049	-.326	
Emotional distress → self-rated health	AA	.117	.262	.167	.068	.700
	Non-AA	<.001	.329	.056	.075	
Income → self-rated health	AA	<.001	.094	.017	.175	.946
	Non-AA	<.001	.093	.006	.154	
# of co-morbidities → self-rated health	AA	<.001	-.118	.014	-.242	.072
	Non-AA	<.001	-.147	.005	-.280	
Time → physical distress	AA	.352	-.009	.009	-.025	.602
	Non-AA	<.001	-.014	.003	-.047	
Time → emotional distress	AA	.324	-.008	.008	-.027	.744
	Non-AA	<.001	-.011	.002	-.042	
Time → employment/finance problems	AA	.205	-.014	.011	-.038	.733
	Non-AA	<.001	-.019	.003	-.071	
Time → fear of recurrence	AA	.174	-.018	.013	-.040	.071
	Non-AA	<.001	-.043	.004	-.100	
Stage → physical distress	AA	.038	.029	.014	.057	.162
	Non-AA	<.001	.049	.004	.112	
Stage → emotional distress	AA	.076	.021	.012	.048	.752
	Non-AA	<.001	.025	.004	.066	
Stage → employment/finance problems	AA	.154	.022	.016	.043	.821
	Non-AA	<.001	.026	.004	.065	
Stage → fear of recurrence	AA	.051	.038	.019	.057	.671
	Non-AA	<.001	.047	.007	.072	

among African Americans compared to non-African Americans. In fact, time since diagnosis was not associated with any cancer-related problems among African Americans.

Peace is one aspect of spirituality that was associated with cancer-related problems. Specifically, greater peace was associated with lower physical and emotional distress, as well as fewer employment and finance problems for both groups, but these associations were significantly stronger among African Americans. These results coincide with literature indicating the importance of

spirituality in coping with cancer among African Americans. Hawkins et al. (2010) found that spirituality was associated with positive behavior change after cancer diagnosis for African Americans, even after adjusting for important socio-demographic and medical factors [14]. It may be the peace derived from one's spirituality that promotes more active coping with cancer-related problems among African Americans.

Faith is another aspect of spirituality that was associated with cancer-related problems. Higher levels of faith were

associated with more physical distress and greater employment and finance problems, and this association was significantly stronger among African Americans. Although we cannot determine the direction of this relationship due to the cross-sectional nature of the data, it is possible that adversities related to the cancer experience strengthened individuals' faith. Some of the items assessing physical distress include feeling dependent, difficulty returning to former roles, and continued major health problems. Items assessing employment/finance problems included perceived job discrimination, difficulty with medical expenses, and being less able to financially provide for family. In times of distress and/or adversity, it is plausible that faith becomes stronger. Harper et al. [30] conducted a qualitative investigation among CRC survivors and found that African American survivors placed high value on having a 'survivor mindset,' which was described as 'a conscious choice to be confident and 'fight' cancer.' Harper et al. [30] also found that many survivors viewed their cancer diagnosis as an opportunity to get closer to God (i.e. strengthened their 'faith' in times of adversity).

Health has been defined as 'a synergistic interplay between physical, social, psychological, and spiritual elements that create the well-being of individuals and/or groups in their physical and social environment' [31]. The present study provides insight into the conceptualization of health among cancer survivors. Both physical distress and emotional distress were negatively associated with SRH for non-African Americans, while only physical distress was significantly associated with SRH among African Americans. It appears that among African Americans in this study, emotional distress was less important compared to physical distress in their assessment of overall health status. This finding is consistent with previous literature that suggests the single-item SRH measure only captures the physical component of health for some populations and does not tap into the other dimensions of the construct [32].

Though unmeasured in this study, pain may be of interest in future studies examining the relationship between cancer-related problems and SRH. The physical distress subscale of the Cancer Problems in Living scale may be a proxy for physical discomfort, including pain. Thus, our findings are particularly important for research indicating racial/ethnic disparities in the experience and management of cancer-related pain. In particular, African American cancer survivors report greater pain intensity, more pain-related distress, and more pain-related interference with functioning compared to non-Hispanic White survivors [33]. Anderson et al. [34] conducted a critical review of racial/ethnic disparities in pain and identified various patient, provider, and health care system-related factors that influence these disparities. For example, literature indicates Latino and African American cancer patients are more likely to believe that pain is inevitable,

and are also more likely to report concerns about taking opioids for pain management compared to non-Hispanic White cancer patients. Literature also suggests inadequate training in pain assessment and treatment among health care providers, as well as a tendency to underestimate pain severity among minority patients [34,35].

A limitation to the current study is the cross-sectional nature of our data. Cross-sectional survey data does not adequately test our causal hypothesis, but provides support for the associations between variables in our structural model. To assess causality, hypotheses would need to be confirmed in a future longitudinal study. Also, there may be other factors not assessed in the present analyses that impact SRH, such as health behaviors and depressive symptoms. Another limitation is that we were unable to assess changes in comorbidity from pre to post cancer treatment. Despite data limitations, this study is strengthened by our use of SEM, which allowed us to simultaneously examine inter-relations among multiple predictor and outcome variables. This is a significant advantage over traditional multiple regression techniques that can only accommodate a single outcome (see Holmbeck [36] for a review). Additionally, we can account for measurement error which allows for greater precision in our estimates. Finally, a strength to our study includes the use of a large, diagnostically and geographically diverse sample of cancer survivors. The heterogeneous sample of cancer survivors in this study may also serve as a limitation in that variations between subgroups of survivors may not have been identified.

## Conclusions

This study builds upon research examining racial/ethnic variations in the associations between spirituality and health outcomes. Disparities in the experience of cancer-related problems may diminish the positive association between spirituality and SRH for African Americans compared with non-African Americans. Further, the single-item measure of SRH may not adequately assess the multiple dimensions of health across racial/ethnic groups. Findings from this study indicate that increased physical distress may help explain disparities in SRH among African American cancer survivors. However, additional research is needed to identify more specific aspects of physical distress driving these disparities, such as pain. Future studies in this line of research should consider a multidimensional measure of health to help capture nuances the conceptualization of health across racial/ethnic groups.

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