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The Impact of Childhood Cancer: Perceptions of Adult Survivors

Victoria W. Willard, PhD¹, James L. Klosky, PhD¹, Chenghong Li, PhD², Deo Kumar Srivastava, PhD², Tara M. Brinkman, PhD³, Leslie L. Robison, PhD³, Melissa M. Hudson, MD^{3,4}, and Sean Phipps, PhD¹

¹Department of Psychology, St. Jude Children's Research Hospital

²Department of Biostatistics, St. Jude Children's Research Hospital

³Department of Epidemiology & Cancer Control, St. Jude Children's Research Hospital

⁴Department of Oncology, St. Jude Children's Research Hospital

Abstract

Background—To describe perceptions and associated risk factors of the impact of cancer on functional outcomes including social relationships, exercise, finances, and religion among adult survivors of childhood cancer.

Methods—Evaluable participants included 3001 adult survivors (mean age 32.5 years [range 18.3–63.8], 24.1 years from diagnosis, 50.8% male, 84.9% Caucasian) enrolled in the St. Jude Lifetime Cohort study. Perceptions of the impact of cancer were assessed using the Brief Cancer Impact Assessment (BCIA). Regression models were used to evaluate risk factors for functional outcomes.

Results—The median response on the BCIA was a perception that cancer had minimal impact on the domains assessed. Approximately 33.1 to 46.6% of survivors indicated this response across the four subscales, though responses ranged from very positive to very negative impact. Other than diagnosis (with survivors of brain tumors generally indicating a more negative impact of cancer [estimates = −1.25 (Caregiving & Finance), −1.01 (Social & Emotional); OR = 1.83 (Exercise & Diet)]), most variability was due to demographic factors, including gender, age, race, education and employment.

Conclusions—Findings highlight that many long-term adult survivors perceive minimal impact of childhood cancer on functional aspects of adulthood, including caregiving, finances, exercise,

Corresponding Author: Victoria W. Willard, PhD, Department of Psychology, St. Jude Children's Research Hospital, 262 Danny Thomas Place, Mail Stop 740, Memphis, TN 38105, P: (901) 595-5336, F: (901) 595-4701, victoria.willard@stjude.org.

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Author Contributions:

Willard: conceptualization, writing original, writing review/editing, visualization

Klosky: conceptualization, investigation, writing review/editing, supervision

Li: formal analysis, data curation, writing original, writing review/editing, visualization

Srivastava: conceptualization, methodology, formal analysis, writing original, writing review/editing, visualization, supervision

Brinkman: conceptualization, investigation, writing review/editing, supervision

Robison: conceptualization, methodology, investigation, resources, writing review/editing, supervision

Hudson: conceptualization, methodology, investigation, resources, writing review/editing, supervision, funding acquisition

Phipps: conceptualization, writing original, writing review/editing, visualization

social-emotional relationships and religion. This suggests that survivors may not be focusing on the influence of likely physical and psychological late effects of their disease in their day-to-day lives. For those who do perceive a negative impact, variability in responses suggests groups of survivors that may benefit from interventions focused on achievement of functional goals.

Precis

The current study assessed perceptions of the impact of childhood cancer on functional outcomes by adult survivors enrolled on the St. Jude Lifetime Cohort Study. Generally, survivors perceived minimal impact of their cancer experience on their current functioning, though variability with regards to demographic variables and diagnosis of a brain tumor was present.

Keywords

childhood cancer; adult survivors; quality of life; SJLIFE; impact of cancer

Over the past four decades, survival rates for most childhood cancers have significantly increased. Currently, approximately 1 in 530 young adults is a survivor of childhood cancer.^{1, 2} With improvements in survival has come significant interest in the long-term outcomes and quality of life of survivors.³ Beyond health-related outcomes, studies often focus on the quantification of psychosocial metrics such as the attainment of developmental milestones including educational achievement, vocational success, and relationship status,⁴⁻⁶ and mental health outcomes such as psychological distress.^{7, 8} However survivors' *perception* of the impact that their cancer has had on these key domains of adult functioning has not been well-described.

Long-term survivors are at risk for difficulties within a variety of domains, including cardiac, endocrine, reproductive, neurological and psychosocial.^{9, 10} Despite the high prevalence of late effects, many survivors describe their cancer experience as positive, and attribute psychological growth or change to their experiences.^{11, 12} This construct is often called "benefit finding" or "posttraumatic growth" and refers to the ability to find positive implications from, or make meaning of, a potentially serious event like cancer. A recent paper¹¹ demonstrated that almost 90% of young adult survivors reported at least one positive change as a result of cancer; others have found similar patterns.¹²⁻¹⁴ Posttraumatic growth or benefit finding is typically thought to be psychological in nature (e.g., quicker development of maturity, increased empathy). As such, questions remain regarding survivors' perceptions of the potential impact on more objective adult goals such as the attainment of educational, employment, or social milestones.

Several recent studies have used a qualitative approach to examine the perceived impact of childhood cancer,^{15, 16} with the majority of survivors identifying both positive and negative consequences. Negative consequences included concerns about physical functioning, fertility, health care, and psychosocial issues, while positive themes included compassion for others, increased positive view of life and self, improved personal relationships, and increased knowledge about health care systems.^{15, 16} In many ways, the positive changes are similar to those that fall under the rubric of benefit finding or posttraumatic growth.

However, these studies also identified more functional consequences of childhood cancer, including an effect on physical functioning and fertility.

While these studies provide useful information regarding the potential functional consequences of childhood cancer, their findings are somewhat limited by reliance on qualitative methodology, smaller sample sizes, and an inability to examine predictors. To truly understand survivors' perceptions of the impact of cancer on their day-to-day lives, both positive and negative, further work is needed. As such, the objectives of the current paper are to describe survivors' perceptions of the impact of cancer in four key domains: caregiving (e.g., parenting, caring for others) and finances, exercise and diet, social and emotional functioning, and religiosity. Specifically, participants were asked to rate the impact of their cancer diagnosis on each of these domains, with options ranging from very positive to very negative. Using a large, well-described sample of adult survivors, demographic and treatment predictors of variability in perception were examined, in addition to the influence of psychological functioning.

Methods

Participants

St. Jude Lifetime Cohort (SJLIFE) is a prospective, longitudinal epidemiological study with ongoing accrual of long-term survivors of childhood cancer who were treated at St. Jude Children's Research Hospital (SJCRH).¹⁷ Eligibility criteria include: 1) diagnosis and treatment of a malignancy at SJCRH; 2) >10 years from diagnosis; and 3) age >18 years. The current report reflects data available as of June 30, 2014. After initial eligibility criteria were reviewed, 4566 survivors were confirmed eligible, with 3090 (67.7%) ultimately completing the measures necessary for the current project, and 3001 having evaluable data (Figure 1). SJLIFE is approved by the SJCRH IRB and consent was obtained via institutional policies.

Measures

Brief Cancer Impact Assessment (BCIA).^{18, 19}—The BCIA – our primary outcome measure – was developed for use with survivors of breast cancer and designed to provide a brief assessment of the impact of cancer diagnosis and treatment on domains thought to be important to long-term survivors: caregiving, finances, education, social relationships, family plans, exercise and diet, work, and religion. Items use a 5-point Likert-type scale ranging from very negative (–2) to very positive impact (+2) with an option of no impact (0) anchoring the scale. A factor analysis¹⁹ yielded four subscales: Caregiving and Finances (6 items (e.g., ability to care for children, financial situation); current sample Cronbach's $\alpha = .85$), Social and Emotional (5 items (e.g., family plans, love life, living arrangements); Cronbach's $\alpha = .84$), Exercise and Diet (2 items; Cronbach's $\alpha = .71$); and Religiosity (3 items; Cronbach's $\alpha = .89$).

Brief Symptom Inventory 18 (BSI-18).²⁰—The BSI-18 is a brief measure of psychological distress, and has been validated for use with adult survivors of childhood cancer.²¹ Questions assess the frequency of psychological symptoms over the past 7 days

using a 5-point Likert scale ranging from “not at all” to “extremely.” Three subscales (Anxiety, Depression, Somatization) and a global score are derived; the global score – Global Symptoms Index (GSI) – was used for analyses. Cronbach’s α for the current sample was .92.

Perceived Stress Scale (PSS).²²—The PSS is a 4-item measure of the degree to which a person perceives aspects of their lives to be stressful. On a 5-point Likert scale from “never” to “very often,” respondents rate how often in the past month they perceived their ability to handle stressors (e.g., important things, responsibilities, personal problems). The PSS is not a clinical scale and so does not provide cut-offs, but a large sample of adults living in England reported a mean of 6.11 (SD=3.14).²³ A total score was used for analyses with higher scores indicating greater perceived stress, with a Cronbach’s α of .74.

Worry questions—Concerns about cancer were assessed using a 5-point Likert scale (“strongly disagree” to “strongly agree”) for questions regarding general fears about cancer, concerns about physical problems related to cancer, appearance, fear of relapse, and worry prior to check-ups. These same questions have been used to good effect in other studies at SJCRH.^{24, 25} A total score was used for analyses, with higher scores indicative of greater worry. Cronbach’s α for the current sample was .81.

Analytical Plan

Descriptive statistics were used to characterize the sample with regards to demographic and treatment variables, as well as the four questionnaire measures. Distributions for the four BCIA subscales are illustrated in Figure 2. For analytical purposes, the Caregiving & Finance and Social & Emotional subscales had a wide range of scores and were analyzed continuously. In contrast, the Exercise & Diet subscale had a discrete distribution and was analyzed categorically: no impact, positive impact and negative impact. Similarly, Religiosity was dichotomized as positive impact versus negative/no impact.

Subsequently, analyses were completed to assess the impact of various demographic, treatment, and psychological predictors on the four BCIA outcome variables. For all models, diagnostic group (Leukemia/Lymphoma, CNS, other), age at diagnosis, and gender were identified as important predictors to include and forced in the model selection. Other variables included were: demographic (age, race, marital status, employment, living arrangements, education, and household income), treatment-related (diagnosed with a second cancer), and psychological functioning (BSI GSI T-score, PSS total score, and Worry total score). Other treatment variables were not included due to small numbers (e.g., amputation, bone marrow transplant) and/or significant overlap with diagnosis (e.g., treatment history).

Bayesian model average (BMA)²⁶ was used for variable selection. Multiple linear regression was used for the Caregiving & Finance and Social & Emotional subscales. Multinomial logistic regression²⁷ was used for the Exercise & Diet subscale modeling both positive impact and negative impact versus no impact. Modified Poisson regression with robust error estimate^{28, 29} was used for the Religiosity subscale modeling positive versus non-positive

impact. BMA model selection was conducted in R (Vienna, Austria); all other analyses were completed in SAS v9.3 (Cary, NC).

Results

Descriptive Analyses

Survivors were an average of 32.5 years old at survey completion ($SD=8.5$). The sample was 50.8% male and 84.9% Caucasian with the majority married or living as married (50%), working full-time (58.9%) and with less than a college education (65.4%). Survivors were diagnosed at approximately 8.4 years of age ($SD=5.6$), and were 24.1 years from diagnosis ($SD=8.2$). Leukemias or lymphomas were the most common diagnoses (58%) and the vast majority of survivors were treated with chemotherapy (85.9%) and/or radiation therapy (60.1%). All participants were off-therapy at the time of study participation. Demographic and treatment information is in Table 1.

Mean scores for each subscale of the BCIA (Table 2) suggest a slightly negative impact for the three practical scores. Examination of the distributions (Figure 2) highlights that a score of 0, or “no impact,” was the modal outcome across indices. The mean GSI was consistent with the normative mean, with 15.6% ($n=465$) of participants scoring in the clinical range. The mean PSS score was significantly higher than what has been observed in non-cancer populations²³ ($t=55.04$, $p < .0001$). Responses on the cancer-related worry questions had a mean equivalent to a “neutral” response.

Modeling

Results for the Caregiving and Finances subscale (Table 3) suggested that diagnostic category was the only significant medical predictor, with survivors of CNS tumors indicating a greater negative effect (estimate= -1.25) and survivors of leukemia/lymphoma reporting a more positive effect (estimate= 0.32) than survivors of other tumors, though their mean score remained slightly negative. There was no association for age at diagnosis. With regards to psychological variables, higher GSI scores (estimate= -0.03) and greater perceived stress (estimate= -0.12) were both associated with a more negative perceived impact. For demographic predictors, females (estimate= 0.76), those who were employed (full-time estimate= 1.61 ; part-time estimate= 1.29), college graduates (estimate= -0.53), and white (estimate= -1.30) perceived a more positive effect than males, those who were unemployed, those with less than a college education, and non-white, respectively. Finally, older survivors perceived a slightly more negative influence than younger survivors (estimate= -0.04).

For the Social and Emotional subscale (Table 3), survivors with higher GSI (estimate= -0.04) and PSS scores (estimate= -0.09) perceived a more negative impact on social-emotional functioning, as did survivors of CNS tumors (estimate= -1.01), whereas survivors of leukemia/lymphoma (estimate= 0.34) perceived a more positive effect (both as compared to survivors of other diagnoses), though their mean score again remained slightly negative. With regards to demographic factors, females (estimate= 0.41), white survivors (estimate= -1.14), employed survivors (full-time estimate= 0.64 ; part-time estimate= 0.56), and survivors living with their spouses (estimate= -0.69) perceived a more positive impact, while

males, non-white survivors, those who were unemployed, and those who lived alone or with someone else (not married) perceived that cancer played a more negative role on their social-emotional outcomes. Older age was also associated with a more negative perceived effect (estimate=-0.04).

For the Exercise and Diet subscale (Table 4), analyses were completed independently comparing positive impact and negative impact to no impact. Survivors of CNS tumors were more likely to indicate a negative impact (Odds Ratio [OR]=1.83, 95%CI 1.32-2.54), while female survivors were more likely to indicate a positive impact (OR=1.30, 95%CI 1.07-1.58) on exercise and diet. Employed survivors were less likely to indicate a negative impact (Full-time: OR=0.57, 95%CI 0.46-0.71; Part-time: OR=0.71, 95%CI 0.52-0.96), while those who had less than a college education were less likely to indicate a positive impact (OR=0.67, 95%CI 0.54-0.83). More psychological distress on the BSI (OR=1.03, 95%CI 1.02-1.04) and greater cancer-related worry (OR=1.04, 95%CI 1.02-1.06) were also associated with a greater likelihood of perceiving a negative impact (as compared to no impact). Older age at diagnosis was associated with a greater likelihood of perceiving an impact, negative (OR=1.04, 95%CI 1.03-1.06) or positive (OR=1.03, 95%CI 1.01-1.05).

For the Religiosity subscale (Table 5), analyses were completed to compare indications of positive impact to negative impact and no impact combined. Results suggested that female survivors (OR=1.26, 95%CI 1.16-1.36), survivors with education achievement less than college graduate (OR=1.34, 95%CI 1.24-1.45) and survivors of leukemia/lymphoma (OR=1.22, 95%CI 1.11-1.34) were more likely to indicate a positive impact, rather than negative/no impact. Additionally, survivors who were older at diagnosis (OR=1.01, 95%CI 1.00-1.02) were also more likely to indicate that their cancer experience had a positive influence, as compared to a negative/no influence.

Discussion

The majority of adult survivors of childhood cancer perceive that cancer has a minimal impact on a variety of current functional outcomes, including caregiving, finances, social-emotional outcomes, exercise, diet and religiosity, with upwards of 30% indicating no impact of cancer at all. A similar pattern was observed for two of our psychological predictors – with survivors exhibiting scores on the BSI and Worry items that were indicative of no concerns. Such findings provide a new perspective that complements and extends the extensive literature describing the negative and positive effects of childhood cancer on later psychosocial and physical outcomes. More specifically, while numerous studies have highlighted the medical and physical consequences of cancer,^{9, 10} and others have addressed the psychosocial benefits that may result from this diagnosis,^{11, 12} the current study instead focused on survivors' perceptions of the impact of cancer on functional and practical aspects of daily living, and found that many survivors do not perceive an influence.

For those patients who did indicate that cancer impacts their functioning, a number of predictors were identified. Specifically, diagnostic- and treatment-specific factors were generally unrelated, with the exception of cancer diagnosis, with survivors of CNS tumors

indicating a more negative impact on many domains, and survivors of leukemia/lymphoma a more positive impact. General psychological functioning was frequently a factor, with higher levels of distress associated with a more negative perceived influence. However, the most predictive factors across domains were demographic: gender, education, current employment, and living arrangements. These findings suggest a possible area of intervention for Survivorship Clinics, as psychosocial providers may be able to use demographic variables as a way of identifying those in need of additional services. Alternatively, the BCIA could conceivably be used as a screening instrument to identify those survivors who may be struggling to reconcile their treatment history with their current functioning.

The primary cancer-related risk factor across domains was the diagnosis of a CNS tumor. Numerous studies have highlighted the neurocognitive and social late effects of surviving a brain tumor^{30, 31} and it is likely that our findings captured survivors' perceptions of these effects on their current functioning. Indeed, the BCIA assesses domains that require adequate neurocognitive (e.g., Caregiving and Finance) and social skills (e.g., Social and Emotional). Relatedly, many experience endocrine³² and neurological deficits³³ that have the potential to influence items captured by the Exercise and Diet subscale. However, our CNS survivors' ability to indicate this perception is somewhat in contrast to the broader literature that has frequently noted a discrepancy between survivors' functioning and their self-report.^{34, 35} It may be that the objective nature of the BCIA's questions (e.g., "did your cancer have an impact on x") permitted survivors a better opportunity to assess this outcome than typical psychological questionnaires that focus more on self-assessment of abilities or psychological functioning. Regardless, our findings add to a growing body of literature highlighting the particular vulnerability of survivors of CNS tumors and point to the need for interventions to address their long-term deficits, and for increased attention during clinical follow-up.

Our overall finding of a median perception of no impact of cancer on functional outcomes is somewhat in contrast to studies that have focused more on emotionally-driven outcomes such as posttraumatic growth or benefit finding. Such studies have noted that participants describe a significant impact of their childhood cancer experience on emotional changes such as increased maturity or a greater appreciation for life.¹¹⁻¹⁴ It is noteworthy that such changes do not carry over to functional outcomes such as caring for children or other family members, financial security, or exercise. The Religiosity subscale may be most in-line with the construct of posttraumatic growth or benefit finding, and on this scale, our mean response was that the cancer experience had a positive impact. Recent work³⁶ with adult cancer patients suggests that faith has a significant influence on both mental and physical health and quality of life. While the construct of religion or spirituality has not been explicitly evaluated in adult survivors of childhood cancer, our results would suggest that it could be a protective factor.

Our findings must be discussed in light of limitations. First, while our sample is large, it represents only about two-thirds of the survivors eligible for SJLIFE, and is predominantly white. Additionally, all survivors were treated at St. Jude and received comprehensive long-term follow-up care. As such, there may be biases in our sample and viewpoints that are under-represented. However, our response rate is consistent with other large epidemiological

studies with similar populations, and prior research suggests no differences between participants and non-participants in the SJLIFE sample.³⁷ Second, all of our measures were self-report, raising the possibility of shared source variance. While this is common for studies with adults, it may have been beneficial to include other viewpoints, such as spouses or caregivers, particularly given evidence that survivors of childhood cancer may under-report on self-report measures.³⁴ However, given that our objective was to evaluate survivors' perceptions of the impact of their cancer experience, a self-report measure was deemed critical. Finally, the BCIA has only been previously been used with adult cancer patients, not specifically with adult survivors of childhood cancer. This may have led an over-reliance on items that are more reflective of issues faced by older adults (e.g., caregiving), and fewer items that address issues that may be important to younger adults (e.g., education, sexuality, etc.). However, it is one of the only scales available that assesses the functional impact of the cancer experience, and therefore, it fit our objectives well. Additionally, alpha reliabilities were strong, and actually, better than those reported for adult patients with breast cancer.¹⁹

Ultimately, findings from the current study highlight that for many survivors, childhood cancer has limited perceived impact – positive or negative – on functional aspects of adulthood. Such findings are somewhat in contrast to the majority of studies that have concentrated on more objective aspects of the negative and positive consequences of childhood cancer on long-term outcomes. This may suggest that while survivors are likely to exhibit a number of physical and psychosocial late effects from their childhood illnesses, they are not focusing on these factors in their day-to-day lives. For those in our study who did perceive an impact of cancer, variability in responses was influenced by a number of factors, most notably, demographic. Such findings speak to the natural variability of these factors, regardless of cancer history, but also point to the potential for intervention that focuses on helping adult survivors of childhood cancer to achieve their functional goals.

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Figure 1.
CONSORT diagram.

Figure 2. Distribution of cancer impact outcomes

Responses on the BCIA range from “very negative impact” to “very positive impact,” with “no impact” anchoring the center. Each subscale has a different number of items.

Table 1

Demographic and cancer-related characteristics of study participants (N=3001)

	N (%)
<i>Demographic Characteristics</i>	
Age	
Mean $\pm$ SD	32.5 $\pm$ 8.5
Median	31.5
Range	18.3–63.8
Gender	
Female	1476 (49.2)
Male	1525 (50.8)
Race *	
White	2549 (84.9)
African-American	410 (13.7)
Other	42 (1.4)
Marital Status	
Single, never married	1088 (36.3)
Married, living as married	1499 (50.0)
Separated, divorced, widowed	410 (13.7)
Living Arrangements	
Living with spouse	1522 (50.9)
Living with others (siblings, roommates, parents)	1092 (36.5)
Living alone	378 (12.6)
Employment Status	
Full-time	1754 (58.9)
Part-time	376 (12.6)
Unemployed	850 (28.5)
Education	
Some college or less	1930 (65.4)
College graduate or more	1019 (34.6)
Household income	
<\$40,000	1168 (45.2)
\$40,000+	1415 (54.8)
<i>Cancer-Related Characteristics</i>	
Age at diagnosis (years)	
Mean $\pm$ SD	8.4 $\pm$ 5.6
Median	7.5
Range	0.0–21.8
Time since diagnosis (years)	
Mean $\pm$ SD	24.1 $\pm$ 8.2
Median	23.2
Range	10.2–48.3

	N (%)
Diagnosis [†]	
Leukemia	1124 (37.5)
Lymphoma	617 (20.6)
CNS tumors	296 (9.9)
Wilms Tumor/Neuroblastoma	324 (10.8)
Osteosarcoma/Ewings Sarcoma	204 (6.8)
Other solid tumors	240 (8.0)
Retinoblastoma/Rhabdomyosarcoma	185 (6.2)
Other	11 (0.4)
Treatment History	
Chemotherapy	2577 (85.9)
Radiation Therapy	1803 (60.1)
Surgery	1376 (45.9)
Amputation	110 (4.0)
Bone marrow transplant	130 (4.3)
Allogeneic/Autologous	5 (3.8)
Allogeneic	62 (47.7)
Autologous	62 (47.7)
Relapse	338 (11.3)
Second cancer diagnosis	455 (15.2)
Age at diagnosis	
Mean $\pm$ SD	32.4 $\pm$ 11.0

Note. For some variables, information is not known or was unreported and therefore totals will not reach 3001. Percentages were calculated based on known information and total 100%.

* For analytical purposes, race was dichotomized as white (n=2549) and non-white (n=452)

[†] For analytical purposes, diagnoses were collapsed to Leukemia/Lymphoma (n=1741), CNS tumors (n=296) and Other (n=964)

Table 2

Descriptive statistics for the BCIA, BSI, PSS, and Worry Scale.

	Mean $\pm$ SD	Median		Range
Brief Cancer Impact Assessment ^a			% "No Impact"	
Caregiving and Finances	-0.4 $\pm$ 4.1	0	33.3	-12 – +12
Social and Emotional	-0.5 $\pm$ 3.6	0	33.1	-10 – +10
Exercise and Diet	-0.1 $\pm$ 1.6	0	46.2	-4 – +4
Religiosity	1.2 $\pm$ 2.6	0	46.6	-6 – +6
Brief Symptom Inventory ^b			% Clinical Range	
Global Symptoms Index	50.0 $\pm$ 11.3	48	15.6	33–81
Perceived Stress Scale	9.6 $\pm$ 3.5	9		4–20
Worry Scale	14.4 $\pm$ 4.8	15		5–25

^aResponse options range from -2 (very negative impact) to 0 (no impact) to +2 (very positive impact). Each subscale has a different number of items, thus the varied ranges.

^bT-score, normative mean=50, SD=10; Clinical range = T-score - 63

Table 3

Influence of various factors on the Caregiving and Finance and Social and Emotional subscales.

<i>Caregiving and Finance</i>				
Predictor	Level	Estimate	Standard Error	p
GSI T-Score	1 unit	−0.03	0.01	0.0002
PSS Total Score	1 unit	−0.12	0.03	<.0001
Diagnostic Category	CNS tumors vs. other	−1.25	0.27	<.0001
	Leukemia/Lymphoma vs. other	0.32	0.16	.048
Age at diagnosis	1 year	0.01	0.01	.31
Gender	Female vs. male	0.76	0.15	<.0001
Current age	1 year	−0.04	0.01	<.0001
Race	White vs. non-white	−1.30	0.21	<.0001
Employment	Full-time vs. unemployed	1.61	0.18	<.0001
	Part-time vs. unemployed	1.29	0.25	<.0001
Education	<College graduate vs. College graduate or above	−0.53	0.16	.0009
<i>Social and Emotional</i>				
Predictor	Level	Estimate	Standard Error	p
GSI T-Score	1 unit	−0.04	0.01	<.0001
PSS Total Score	1 unit	−0.09	0.02	.0001
Diagnostic Category	CNS tumors vs. other	−1.01	0.24	<.0001
	Leukemia/Lymphoma vs. other	0.34	0.14	0.01
Age at diagnosis	1 year	0.02	0.01	0.12
Gender	Female vs. male	0.41	0.13	.0015
Current age	1 year	−0.04	0.01	<.0001
Race	White vs. non-white	−1.14	0.18	<.0001
Employment	Full-time vs. unemployed	0.64	0.16	<.0001
	Part-time vs. unemployed	0.56	0.22	.0099
Living arrangement	Alone vs. with spouse	−0.69	0.20	.0007
	With other vs. with spouse	−0.54	0.16	.0006

Table 4

Influence of various factors on the Exercise and Diet subscale

	Negative impact vs. no impact	Positive impact vs. no impact	
	OR (95% CI)	OR (95% CI)	p
GSI T-score	1.03 (1.02–1.04)	0.99 (0.98–1.00)	<.0001
Worry total score	1.04 (1.02–1.06)	1.03 (1.00–1.05)	.001
Diagnosis			<.001
CNS tumors	1.83 (1.32–2.54)	0.92 (0.62–1.36)	
Leukemia/Lymphoma	1.04 (0.85–1.27)	1.18 (0.95–1.46)	
Others	1.0	1.0	
Age at diagnosis	1.04 (1.03–1.06)	1.03 (1.01–1.05)	<.0001
Gender			.03
Female	1.04 (0.86–1.24)	1.30 (1.07–1.58)	
Male	1.0	1.0	
Current age	1.00 (0.98–1.01)	0.98 (0.96–0.99)	.002
Race			.0004
White	0.91 (0.70–1.18)	0.59 (0.45–0.77)	
Non-white	1.0	1.0	
Employment			
Full-time	0.57 (0.46–0.71)	0.80 (0.62–1.03)	<.0001
Part-time	0.71 (0.52–0.96)	1.25 (0.90–1.74)	
Unemployed	1.0	1.0	
Education			<.0001
<College graduate	1.17 (0.95–1.43)	0.67 (0.54–0.83)	
College graduate or above	1.0	1.0	

Note. Model selection was initially completed using BMA to compare no impact (n=1357, 46.2%) to perceived positive impact (n=654, 22.3%) and to perceived negative impact (n=926, 31.5%), respectively. Selected variables from these two models were included in a multinomial logistic regression.

Table 5

Influence of various factors on the Religiosity subscale

	Positive impact vs. Negative or no impact	
	OR (95% CI)	p
Age at diagnosis	1.01 (1.00–1.02)	.007
Gender		
Female	1.26 (1.16–1.36)	<.0001
Male	1.0	
Education		
<College graduate	1.34 (1.24–1.45)	<.0001
College graduate or above	1.00	
Diagnostic Category		
CNS Tumors	1.13 (0.97–1.23)	<.0001
Leukemia/Lymphoma	1.22 (1.11–1.34)	
Other	1.0	

Note. Model reflects the probability of survivors describing their cancer experience as having a positive impact (n=1321, 44.9%) vs. no or negative impact (n=1619, 55.1%) on religiosity.