Published in final edited form as:

Support Care Cancer. 2014 November ; 22(11): 3027–3034. doi:10.1007/s00520-014-2308-y.

Marital status and optimism score among breast cancer survivors

Lindsay Croft,

Department of Epidemiology and Public Health, University of Maryland, Baltimore, Baltimore, MD, USA

John Sorkin, and

Baltimore VA Medical Center Geriatrics Research, Education, and Clinical Center, University of Maryland Claude D. Pepper Older Americans Independence Center and Division of Gerontology and Geriatric Medicine, University of Maryland School of Medicine, Baltimore, MD, USA

Lisa Gallicchio

Department of Epidemiology and Public Health, University of Maryland, Baltimore, Baltimore, MD, USA. The Prevention and Research Center, Weinberg Center for Women's Health, Mercy Medical Center, 227 St. Paul Place, Baltimore, MD 21202, USA. Department of Epidemiology, Johns Hopkins Bloomberg School of Public Health, Baltimore, MD, USA

Lisa Gallicchio: lgallic@mdmercy.com

Abstract

Purpose—There are an increasing number of breast cancer survivors, but their psychosocial and supportive care needs are not well-understood. Recent work has found marital status, social support, and optimism to be associated with quality of life, but little research has been conducted to understand how these factors relate to one another.

Methods—Survey data from 722 breast cancer survivors were analyzed to estimate the association between marital status and optimism score, as measured using the Life Orientation Test-Revised. Linear regression was used to estimate the relationship of marital status and optimism, controlling for potential confounding variables and assessing effect modification.

Results—The results showed that the association between marital status and optimism was modified by time since breast cancer diagnosis. Specifically, in those most recently diagnosed (within 5 years), married breast cancer survivors had a 1.50 higher mean optimism score than unmarried survivors (95 % confidence interval (CI) 0.37, 2.62; $p=0.009$). The difference in optimism score by marital status was not present more than 5 years from breast cancer diagnosis.

Conclusions—Findings suggest that among breast cancer survivors within 5 years since diagnosis, those who are married have higher optimism scores than their unmarried counterparts; this association was not observed among longer-term breast cancer survivors. Future research

Correspondence to: Lisa Gallicchio, lgallic@mdmercy.com.

Conflict of interest The authors have no conflicts of interest to disclose. The authors have full control of all primary data, and the journal will be allowed to review the data if requested.

should examine whether the difference in optimism score among this subgroup of breast cancer survivors is clinically relevant.

Keywords

Cancer; Survivorship; Social support; Optimism; Marital status

Introduction

In 2013, 232,340 new cases of breast cancer were expected in the USA, representing approximately 1 in 3 diagnosed cancers in American women [1]. Given the high 5-year survival rate for women with breast cancer (approximately 99 % for women diagnosed with early-stage breast cancer), most women survive their breast cancer. Despite the large number of breast cancer survivors, there is a lack of understanding of what physical and emotional measures of well-being should be monitored by clinicians and what effective interventions are available to modify these constructs [2].

Marital status and optimism are considered factors in physical and emotional well-being across a range of populations, including breast cancer patients [3–7]. Marital status is commonly used as a marker of social support. Optimism is defined as the “generalized expectations of good versus bad outcomes in life” [8]. In the general population, a recent cross-sectional study showed that marital status was associated with optimism and optimism was related to well-being [7]. However, few published studies have examined the association between marital status and optimism among breast cancer patients [3, 4]. Those studies that have examined these associations suggest that optimism and marital status at study baseline (usually early in postsurgical treatment) can predict psychosocial well-being, measured as depression, mood disturbance, and social disruption, in follow-up 5–13 years later [3, 4]. A limitation of previously published studies is that they contribute knowledge on optimism and marital status only among recently diagnosed breast cancer patients or for a time prior to a breast cancer diagnosis. These time points may not reflect the dynamics of long-term survivor populations or account for changes in optimism or marital status since the diagnosis and treatment stages.

Although marital status and optimism are often used as predictors of quality of life (QOL), most studies do not address how marital status and optimism are mechanistically related. Marital status may be associated with optimism beyond their use as single time point predictors of QOL; optimism may be an intermediate in the association pathway for marital status and QOL. It is unclear if the marital status-optimism associations identified among the general population [7] also exist among breast cancer survivors. Furthermore, much of the work in examining optimism of breast cancer survivors has utilized social support rather than marital status. Because few studies have examined the association between marital status and optimism in breast cancer survivors and the few that do provide conflicting results on whether marital status and social support measure the same construct, the relationship between marital status and optimism in this population remains largely unknown. The present analysis was conducted using survey data from 722 breast cancer survivors of

different races and at different stages of the survivorship continuum to examine whether marital status was related to optimism in this population.

Methods

Study design

This survey study was approved by the Mercy Medical Center Institutional Review Board, Baltimore, MD. Survivors of all cancer types were identified from patients in the Mercy Medical Center Cancer Registry between January 1996 and July 2007 ($n=4,398$). Patients were mailed a survey on long-term health outcomes (including cardiovascular disease, sleep issues, and physical functioning) among cancer survivors in June 2008 and again to nonrespondents in November 2009. The survey was designed to help develop institution-specific programs for cancer survivors as well as to better understand the role of patient characteristics and cancer treatments on long-term health, including that related to cardiovascular health and physical functioning [9–11]. The survey took approximately 20 minutes to complete, and consent was implied by return of the questionnaire.

Of the cancer survivors mailed questionnaires, 2,513 were breast cancer survivors (57.1 % of all survivors in the registry); 863 (34.3 %) returned the survey. Nonrespondents were more likely to be African-American ($p<0.05$) but were not significantly different from respondents based on their sex, year from diagnosis, or disease invasiveness (in situ versus invasive cancer). Female breast cancer survivors identified from the registry ($n=863$) comprised the initial dataset. Respondents missing data on optimism score, marital status, or both ($n=63$) and respondents with missing data for variables included in the final regression analysis (physical functioning, depressive symptoms, age, race, education, employment status, smoking, fatigue, pain interference, or self-rated health) were excluded from analysis. Thus, the analytic dataset contained 722 respondents. The median number of years since breast cancer diagnosis of these survivors was 7 years (range 1–43 years).

Marital status of the breast cancer survivors was assessed with a question on current marital status. Possible responses included the following: single, married/living with partner, or widowed. All analyses were conducted as married (married/living with partner) versus unmarried (single or widowed). A separate analysis was conducted to examine the appropriateness of combining the single and widowed groups into a single-reference group. Two separate linear regression models, containing the same covariates as our reported results, were constructed; one model used single participants as a reference group while the second model used only widowed as a reference. The magnitude and direction of the parameter estimates were similar; thus, only the results for the combined comparison group (single or widowed) are reported.

The survey included the Life Orientation Test-Revised (LOT-R) which was used to quantify optimism. The LOT-R is a widely used, validated scale with scores ranging from 0 to 24 [8]. The LOT-R has respondents use a Likert-like scale (strongly disagree, disagree, neutral, agree, strongly agree) to quantify the degree they agree, or disagree, with an optimism-related statement. The most optimistic response receives 4 points and the least receives no points. The LOT-R's six questions are summed to produce an overall score, analyzed as a

continuous measure. One example of the LOT-R items is “I hardly ever expect things to go my way.”

The respondent’s depressive symptoms were measured using the Centers for Epidemiologic Studies-Depression Scale (CES-D), a well-validated measure of depressive symptoms [12]. The CES-D consists of 20 items, and the respondent is asked to rate each item on how frequently the statement was true for them in the previous week using a 4-point Likert scale (rarely or none of the time, some of the time, occasionally or a moderate amount of time, most or all of the time). Responses to each question are summed; an individual with a score of 16 points or more is considered to have depressive symptoms [12]. Social support was measured using the validated Interpersonal Support Evaluation List (ISEL-12), which is a 12-item scale, with questions answered using a Likert scale. The ISEL-12 excludes the self-esteem subscale of the larger scale [13]. The fifth ISEL-12 question was inadvertently omitted from the study survey; thus, a summary score was calculated using the 11 remaining ISEL-12 questions. Higher scores on the scale correspond to higher social support (score range 0–44). The survey also asked about the type of treatment received at breast cancer diagnosis (radiation, chemotherapy, hormone therapy). Responses for treatment type were also then verified using Mercy Medical Center patient records. The Spirituality Self-Rating Scale assessed spirituality with a continuous scale produced by summing six individual Likert scale items, with a possible score range of 6–30 [14], with higher values indicating greater spirituality. Physical function was measured by calculating a summary score (range 0–32) for the 12-item limitation of functional activity component of the Adult Health Status and Limitation of Activity section from the National Health Interview Survey [11]. The summary score was then categorized into “no limitation” and three tertile-based categories (low, intermediate, and high limitation scores). Information on fatigue was collected from responses to “rate the amount of fatigue you have experienced over the past 4 weeks.” The 10-point Likert-like scale responses ranged from 1 “no fatigue” to 10 “extreme fatigue.” Other variables collected and examined as part of the analysis were the following: age, race, employment status, body mass index (BMI), daily alcohol consumption, education, self-rated health, physical activity, smoking (current, former, never), pain, and length of survivorship. Length of survivorship was dichotomized using the cutpoint of 5 years based on previous literature which considers 5 years as “long-term” survivorship [15].

Statistical analysis

All analyses were performed using SAS version 9.2 (Cary, NC). A linear regression model containing one independent variable, marital status, was used to estimate the unadjusted association between marital status and optimism. Effect modification and confounding were assessed using linear regression models. Variables considered for possible effect modification were tested in a model containing marital status, the variable, and an interaction term of the variable with marital status. If the interaction term was significant ($p < 0.05$), the variable was considered a significant effect modifier of the marital status-optimism association, and the interaction term was retained in the model. When the interaction was not significant, the interaction term was removed from the model, and the variable was then tested for confounding. Confounding was indicated by a 10 % or greater change in the marital status regression parameter compared to its unadjusted value. Because

the intent of the study was to use marital status as a proxy for social support, social support was not considered as a confounder and was thus not included in the model.

Results

Of the 722 breast cancer survivors comprising the analytic dataset, 57.2 % were married. Mean optimism score in the study sample was 17.0 (SD 4.2). Compared to unmarried breast cancer survivors, married survivors were significantly younger (mean 59.2 vs 64.6; $p<0.0001$), had better physical function, and were significantly more likely to be white (91.3 vs 79.6 %), employed (55.0 vs 42.1 %), and to have never smoked (56.2 vs 45.0 %) (Table 1). Between marital groups, there were no statistically significant differences in types of treatment received, BMI, education level, alcohol consumption, depressive symptoms, or years since breast cancer diagnosis. Social support was significantly higher in the married group than that in the unmarried (39.1 vs 37.3; $p<0.0001$).

In the unadjusted analyses between marital status and optimism stratified by length of survivorship, a statistically significant difference in mean optimism score among married versus unmarried survivors was observed among short-term, but not long-term, breast cancer survivors (Fig. 1). Specifically, among short-term survivors, those who were married had significantly higher mean optimism than those who were unmarried (18.3 vs 16.2; $p=0.0003$). Among long-term survivors, married survivors had 0.4 points higher mean optimism score than unmarried survivors (17.0 vs 16.6; $p=0.24$).

In the adjusted multivariable regression analysis, the modification of the association between marital status and optimism by time since breast cancer diagnosis remained statistically significant ($p<0.05$ for interaction term) (Table 2). Among short-term breast cancer survivors, those who were married had 1.50 points higher mean optimism than those who were unmarried. Married women more than 5 years from diagnosis had 0.37 points higher mean optimism score compared to unmarried breast cancer survivors ($p=0.26$). With respect to other variables in the model, younger age was associated with generally lower optimism score among long-term but not short-term breast cancer survivors. Depressive symptoms were associated with lower optimism score among both long-term and short-term survivors (3.17 points lower among short-term and 4.37 points lower among long-term survivors; $p<0.0001$ for both), while more education and good to excellent self-rated health were significantly associated with higher optimism score among long-term survivors only (education: 1.04, $p=0.003$; self-rated health: 1.44, $p=0.005$).

Discussion

The results from this study indicate that marital status is significantly associated with optimism among short-term but not long-term breast cancer survivors. Specifically, the data showed that within the first 5 years of a breast cancer diagnosis, married women had significantly higher optimism than unmarried women. Trunzo et al. [16] examined social support regressed on optimism using the same optimism scale employed in the present study. Social support was measured with the Duke-UNC Functional Social Support Scale. The study examined women with early stages of breast cancer, all of whom were within the

first year of treatment completion, and showed a statistically significant social support-optimism relationship at baseline, 6 months, and 12 months [16]. A similar percentage of the study sample was married (57 %) compared to the present study (57.2 %), and marital status was similarly categorized. The authors also performed an independent *t* test for marital status as a potential covariate for their main exposure—social support—and found no significant results [16]. The differences in association could be due to use of different measurement scales for assessing social support between the two studies or the assumption of optimism as a stable trait measured only at baseline in the earlier study.

A possible explanation for our finding of effect modification by time since breast cancer diagnosis is that marital status and, thus, social support may be more important for optimism and other outcomes among women in the early part of the breast cancer experience. The Shanghai Breast Cancer Survival cohort demonstrated a significantly decreased risk of total mortality and recurrence of breast cancer 6-month postdiagnosis for women in the highest tertile of social well-being QOL score [17]. Aspects of social well-being found most important at 6 months were marriage and family, social support, and interpersonal relationships. Notably, the relationship between decreased risk and high social well-being score was no longer present 36-months postdiagnosis. Similar to our own results, this may be suggestive of a more immediate postdiagnosis social support role in breast cancer survivors.

That marital status and, thus, social support appear to play a less significant role in optimism among long-term breast cancer survivors is not surprising. More than 5 years from diagnosis, breast cancer survivors are more likely to be able to resume usual activities than short-term survivors and have had more time to adjust to their situation. Additionally, short-term breast cancer survivors may spend more time at home and also require more assistance from a spouse, partner, or another individual for daily living activities than long-term breast cancer survivors.

Limitations of the current study are that the questionnaire did not include specific measures of the quality or duration of marriage, which could potentially modify the strength of the marital status-optimism association. Future studies should investigate the influence of such factors. Also, participants needed to survive to be able to respond to the survey. For survival bias to affect the findings of this study, married breast cancer patients would have to be less likely to survive than unmarried patients, which is unlikely since most breast cancer patients survive. The survey return rate of 34 % may have unintentionally selected more optimistic breast cancer survivors if the more depressed or less optimistic women were less likely to complete and return the survey. However, to alter our findings, the under-sampled less optimistic breast cancer survivors would also need to be more likely to be married.

Despite the above challenges, this study has several strengths. Although causal inference is not possible with a cross-sectional study, this design is the most feasible in light of difficulties encountered with a cohort or case control design which would require determination of whether optimistic traits or marital status came first. Further, there is no currently accepted value for dichotomizing optimism scores; so, a “case” of optimism and “controls” would be difficult to identify.

To the authors' knowledge, this is the largest study examining the association between marital status and optimism. The large sample size permitted consideration of several potential confounders as well as effect modification which may improve characterization of the marital status-optimism association. In addition, the study sample is more diverse than much of the previous work. It includes more than one race rather than being restricted to Caucasians or African-Americans only and includes women over a wider range of time postdiagnosis [16, 18]. Different treatment types were also included in our study and not restricted to women who received surgical treatment only [18]. This more diverse sample may make our findings generalizable to a wider range of female breast cancer survivors.

Significantly increased optimism between married and unmarried survivors was observed only for short-term survivors. If this higher optimism score represents a clinically meaningful difference, this study may indicate that marital status (as a social support proxy) may be most important when survivors are still within 5 years of diagnosis. Unmarried, recently diagnosed breast cancer patients thus may represent a group for which clinicians should pay closer attention to or provide additional resources designed to increase social support. These resources could include referrals for counseling, support groups, and suggestions for ways to compensate for not having someone else present. As yet, it is unclear what constitutes a clinically relevant increase in optimism score, and future research efforts should be directed toward determining either cutoff values or the meaning of LOT-R scores. If a 1.50-point increase in optimism score is determined to not be clinically meaningful, it remains unclear how marital status and optimism may mechanistically relate to improved QOL or measures of psychosocial well-being [3, 19]. In addition to directing future studies toward answering these questions, it will also be important to identify other factors which are associated with optimism.

In summary, this study demonstrates that married breast cancer survivors have higher mean optimism scores compared to unmarried survivors only when they are 5 years or fewer from diagnosis. Among longer-term survivors (>5 years), marital status does not appear to be associated with optimism. Future research efforts should consider the effects of duration and quality of marriage. Additionally, work should be directed at determining the meaning or interpretation behind optimism scores obtained from the LOT-R scale. Breast cancer patients who are not yet at the traditional long-term survivor cutoff may represent a group that could benefit from efforts related to social support. The extent of this possibility remains to be seen and should be investigated.

References

1. American Cancer Society. Breast cancer facts and figures, 2013–2014. Atlanta: American Cancer Society, Inc; 2013. Retrieved from <http://www.cancer.org/acs/groups/content/@research/documents/document/acspc-040951.pdf>
2. Sheppard C. Breast cancer follow-up: literature review and discussion. *Eur J Oncol Nurs*. 2007; 11:340–347. [PubMed: 17709299]
3. Carver CS, Smith RG, Petronis VM, Antoni MH. Quality of life among long-term survivors of breast cancer: different types of antecedents predict different classes of outcomes. *Psychooncology*. 2006; 15:749–758. [PubMed: 16304622]

4. Carver CS, Smith RG, Antoni MH, Petronis VM, Weiss S, Derhagopian RP. Optimistic personality and psychosocial well-being during treatment predict psychosocial well-being among long-term survivors of breast cancer. *Health Psychol.* 2005; 24:508–516. [PubMed: 16162045]
5. Friedman L, Kalidas M, Elledge R, Chang J, Romero C, Husain I, Dulay M, Liscum K. Optimism, social support and psychosocial functioning among women with breast cancer. *Psychooncology.* 2006; 15:595–603. [PubMed: 16287209]
6. Matthews E, Cook P. Relationships among optimism, well-being, self-transcendence, coping, and social support in women during treatment for breast cancer. *Psychooncology.* 2009; 18:716–726. [PubMed: 19034884]
7. Ben-Zur H. Loneliness, optimism, and well-being among married, divorced, and widowed individuals. *J Psychol.* 2012; 146:23–36. [PubMed: 22303610]
8. Scheier MF, Carver CS, Bridges MW. Distinguishing optimism from neuroticism (and trait anxiety, self-mastery, and self-esteem): a reevaluation of the Life Orientation Test. *J Pers Soc Psychol.* 1994; 67:1063–1078. [PubMed: 7815302]
9. Forsythe LP, Helzlsouer KJ, MacDonald R, Gallicchio L. Daytime sleepiness and sleep duration in long-term cancer survivors and non-cancer controls: results from a registry-based survey study. *Support Care Cancer.* 2012; 20:2425–2432. [PubMed: 22218738]
10. Gallicchio L, Calhoun C, Helzlsouer K. Aromatase inhibitor therapy and hair loss among breast cancer survivors. *Breast Cancer Res Treat.* 2013; 142:435–443. [PubMed: 24197658]
11. Gallicchio L, Calhoun C, Helzlsouer KJ. Association between race and physical functioning limitations among breast cancer survivors. *Support Care Cancer.* 2014; 22:1081–1088. [PubMed: 24292017]
12. Radloff LS. The CES-D scale a self-report depression scale for research in the general population. *Appl Psychol Meas.* 1977; 1:385–401.
13. Brummett BH, Babyak MA, Barefoot JC, Bosworth HB, Clapp Channing NE, Siegler IC, Williams RB, Mark DB. Social support and hostility as predictors of depressive symptoms in cardiac patients one month after hospitalization: a prospective study. *Psychosom Med.* 1998; 60:707–713. [PubMed: 9847029]
14. Galanter M, Dermatis H, Bunt G, Williams C, Trujillo M, Steinke P. Assessment of spirituality and its relevance to addiction treatment. *J Subst Abus Treat.* 2007; 33:257–264.
15. Ganz P, Desmond K, Leedham B, Rowland J, Meyerowitz B, Belin T. Quality of life in long-term, disease-free survivors of breast cancer: a follow-up study. *J Natl Cancer Inst.* 2002; 94:39–49. [PubMed: 11773281]
16. Trunzo J, Pinto B. Social support as a mediator of optimism and distress in breast cancer survivors. *J Consult Clin Psychol.* 2003; 71:805–811. [PubMed: 12924685]
17. Epplein M, Zheng Y, Zheng W, Chen Z, Gu K, Penson D, Lu W, Shu X. Quality of life after breast cancer diagnosis and survival. *J Clin Oncol.* 2011; 29:406–412. [PubMed: 21172892]
18. Shelby R, Crespin T, Wells-Di Gregorio SM, Lamdan R, Siegel J, Taylor K. Optimism, social support, and adjustment in African American women with breast cancer. *J Behav Med.* 2008; 31:433–444. [PubMed: 18712591]
19. Cohen, S.; Mermelstein, R.; Kamarck, T.; Hoberman, H. Measuring the functional components of social support. In: Sarason, IG.; Sarason, BR., editors. *Social support: Theory, research and application.* Martinus Nijhoff; The Hague: 1985. p. 73-94.

Fig. 1.

Marital status and mean optimism score stratified by time since diagnosis^a. ^aMean optimism for married breast cancer survivors 0–5 years from diagnosis significantly higher than unmarried 0–5-year survivor mean optimism, $p=0.0003$

Table 1

Characteristics of breast cancer survivors responding to long-term health outcomes survey, by marital status, 2008–2009 (N=722)

Variable	All N (%) N=722	Married N (%) N=413	Unmarried N (%) N=309	p Value ^a
Age (years)				
<50	103 (14.3)	74 (17.9)	29 (9.4)	<0.0001
50–59	212 (29.4)	141 (34.1)	71 (23.0)	
60–69	246 (34.1)	141 (34.1)	105 (34.0)	
70	161 (22.3)	57 (13.8)	104 (33.7)	
BMI (kg/m ²)				
<25	294 (40.7)	178 (43.1)	116 (37.6)	0.27
25 to <30	230 (31.9)	123 (29.8)	107 (34.6)	
30	197 (27.3)	112 (27.1)	85 (27.5)	
Missing	1 (0.1)	0 (0.0)	1 (0.3)	
Race				
White	623 (86.3)	377 (91.3)	246 (79.6)	<0.0001
Non-white	99 (13.7)	36 (8.7)	63 (20.4)	
Education				
High school or less	207 (28.7)	114 (27.6)	93 (30.1)	0.46
Some college/technical school	515 (71.3)	299 (72.4)	216 (69.9)	
Employment				
Employed	357 (49.4)	227 (55.0)	130 (42.1)	0.0006
Not currently employed	365 (50.6)	186 (45.0)	179 (57.9)	
Smoking status				
Never	371 (51.4)	232 (56.2)	139 (45.0)	0.002
Former	304 (42.1)	163 (39.5)	141 (45.6)	
Current	47 (6.5)	18 (4.3)	29 (9.4)	
Alcohol consumption (average drinks/day)				
0	207 (28.6)	113 (27.4)	94 (30.4)	0.40
1	303 (42.0)	183 (44.3)	120 (38.8)	
2	202 (28.0)	114 (27.6)	88 (28.5)	
Missing	10 (1.4)	3 (0.7)	7 (2.3)	
Physical functioning				
No limitations	154 (21.3)	107 (25.9)	47 (15.2)	<0.0001
Tertile 1 limitation score (low)	199 (27.6)	122 (29.5)	77 (24.9)	
Tertile 2 limitation score	192 (26.6)	108 (26.2)	84 (27.2)	
Tertile 3 limitation score (high)	177 (24.5)	76 (18.4)	101 (32.7)	
Depressive symptoms				
Yes	137 (19.0)	73 (17.7)	64 (20.7)	0.30
No	585 (81.0)	340 (82.3)	245 (79.3)	
Chemotherapy				

Variable	All N (%) N=722	Married N (%) N=413	Unmarried N (%) N=309	p Value ^a
Yes	327 (45.3)	195 (47.2)	132 (42.7)	0.23
No	395 (54.7)	218 (52.8)	177 (57.3)	
Radiation				
Yes	454 (62.9)	255 (61.7)	199 (64.4)	0.46
No	268 (37.1)	158 (38.3)	110 (35.6)	
Hormone therapy				
Yes	296 (41.0)	176 (42.6)	120 (38.8)	0.33
No	423 (58.6)	236 (57.1)	187 (60.5)	
Missing	3 (0.4)	1 (0.2)	2 (0.6)	
Years since breast cancer diagnosis				
0–5	201 (27.8)	120 (29.1)	81 (26.2)	0.40
>5	521 (72.2)	293 (70.9)	228 (73.8)	
Optimism score, mean (SD) ^b	17.0 (4.2)	17.4 (4.2)	16.5 (4.0)	0.004
Social support, mean (SD) ^b	38.3 (5.6)	39.1 (5.3)	37.3 (5.8)	<0.0001
Missing (%)	14	7 (1.7)	7 (2.3)	

^a Chi-square test

^b *t* test

Table 2

Adjusted association between marital status and optimism stratified by time since diagnosis

Variable	0 to 5 years since diagnosis ^a				>5 years since diagnosis ^b			
	N	β	95 % CI	p Value	N	β	95 % CI	p Value
Marital status								
Married	120	1.50	(0.37, 2.62)	0.009	293	0.37	(-0.27, 1.01)	0.26
Unmarried	81	0	ref.		228	0	ref.	
Physical functioning								
Tertile 1 limitation score (low)	50	-0.75	(-2.25, 0.74)	0.32	149	-0.03	(-0.91, 0.85)	0.94
Tertile 2 limitation score (intermediate)	54	-0.91	(-2.57, 0.75)	0.28	138	-0.66	(-1.64, 0.32)	0.19
Tertile 3 limitation score (high)	46	-1.61	(-3.66, 0.44)	0.12	131	-1.12	(-2.26, 0.02)	0.05
No limitations	51	0	ref.		103	0	ref.	
Depressive symptoms								
Yes	41	-3.17	(-4.61, -1.73)	<0.0001	96	-4.37	(-5.20, -3.54)	<0.0001
No	160	0	ref.		425	0	ref.	
Age (years)								
70	27	0.53	(-1.49, 2.55)	0.60	134	2.14	(0.91, 3.37)	0.0007
60-69	65	1.79	(0.31, 3.26)	0.02	181	1.40	(0.31, 2.50)	0.01
50-59	60	1.42	(-0.05, 2.89)	0.06	152	1.37	(0.29, 2.45)	0.01
<50	49	0	ref.		54	0	ref.	
Race								
White	168	0.74	(-0.72, 2.21)	0.32	455	-0.69	(-1.61, 0.23)	0.14
Non-white	33	0	ref.		66	0	ref.	
Education								
Some college/technical school	146	0.87	(-0.38, 2.12)	0.17	369	1.04	(0.36, 1.72)	0.003
High school or less	55	0	ref.		152	0	ref.	
Employment								
Employed	109	-0.84	(-2.04, 0.35)	0.16	248	0.05	(-0.66, 0.76)	0.90
Not currently employed	92	0	ref.		273	0	ref.	
Smoking status								
Current	10	-0.67	(-3.28, 1.95)	0.62	37	-0.24	(-1.47, 0.98)	0.70

Variable	0 to 5 years since diagnosis ^a					>5 years since diagnosis ^b				
	N	β	95 % CI	p Value		N	β	95 % CI	p Value	
Former	85	-0.09	(-1.18, 1.00)	0.87		219	0.01	(-0.61, 0.64)	0.97	
Never	106	0	ref.			265	0	ref.		
Fatigue level										
Above median	104	-0.06	(-1.27, 1.16)	0.93		272	-0.49	(-1.16, 0.18)	0.15	
Below median	97	0	ref.			249	0	ref.		
Pain interference with normal work										
A little to extremely	114	0.13	(-1.18, 1.44)	0.85		279	-0.63	(-1.34, 0.08)	0.08	
Not at all	87	0	ref.			242	0	ref.		
Self-rated health										
Good to excellent	179	0.09	(-1.90, 2.08)	0.93		456	1.44	(0.43, 2.44)	0.005	
Poor to fair	22	0	ref.			65	0	ref.		

^aModel $R^2 = 0.28$ ^bModel $R^2 = 0.34$