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Depression predicts longitudinal declines in social support among women with newly diagnosed breast cancer

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Abstract

OBJECTIVE: Among breast cancer survivors, low social support is associated with adverse clinical and psychosocial outcomes. This study prospectively examined longitudinal trends in perceived social support in women with newly-diagnosed breast cancer as a function of depression status prior to initiation of cancer treatment.

METHODS: 110 patients with newly-diagnosed breast cancer and 59 age-matched non-cancer controls completed behavioral measures at four assessments: prior to treatment, and at 1 month, 1 year, and 2 years post-treatment. Participants reported their perceived tangible and emotional/informational support using the Medical Outcomes Study Social Support Survey and were categorized as “depressed” or “non-depressed” based on the Brief Symptom Inventory-18. Analyses first compared longitudinal trends in support between patients and controls, and then examined differences in longitudinal trends as a function of depression status in patients only, controlling for key covariates.

RESULTS: Both tangible and emotional/informational support decreased among breast cancer patients but increased or remained unchanged among non-cancer controls across the assessments. Among patients, depressed individuals experienced a significant decline in both tangible ($p=.004$) and emotional/informational support ($p=.013$) between 1 month and 1 year post-treatment, which remained unchanged between 1 year and 2 years post-treatment. In contrast, non-depressed individuals had stable levels across all assessments. Depressed patients also had lower levels of both support types compared to non-depressed patients across all assessments.

CONCLUSIONS: Breast cancer patients with depressive symptomatology have an elevated risk for declines in perceived social support over time.

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ETHICAL APPROVAL: All procedures performed in this study involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards, and was approved by the City of Hope Institutional Research Board (IRB#10207).

Keywords

breast neoplasms; oncology; cancer; cancer survivors; depression; quality of life; social support; survivorship; women's health

BACKGROUND

Over the past four decades, research has increasingly demonstrated the importance of social support in improving psychosocial outcomes and health-related quality of life in patients with breast cancer. Women with high levels of support experience better psychosocial adjustment, less anxiety and depression, and greater overall functioning during and after treatment for breast cancer.^{1–2} In addition, high support is associated with improved long-term survival compared to individuals lacking support,^{3–4} potentially due to better adherence to treatment recommendations and to the modulation of physiological processes that downregulate tumor growth.^{5–6}

As social support is protective against breast cancer-related morbidity and mortality, it is important to identify risk factors for trajectories of low support that may be present at diagnosis. Patients considered high-risk can then be offered early interventions and closely monitored as they undergo treatment and transition to long-term survivorship. Previous research has examined demographic and clinical factors as potential risk factors, and established that older age,⁷ being non-White,⁸ and being unmarried or widowed^{8–10} predict low or declining support during and after treatment for breast cancer, while cancer stage minimally impacts perceived support.¹¹

In non-cancer populations, the epidemiological and psychological literature shows that depression prospectively predicts declines in social support across time.^{12–18} A Canadian study with a nationally representative community sample of 9,340 individuals showed that those who had experienced a major depressive episode were more likely to fall within the lowest quartile of perceived affectionate support 2 years later.¹² In a study of depressed patients, those who spent longer time in unremitting major depression were more likely to have lower objective and subjective support 18 months later.¹³ In older adults, depression predicted worsening support and greater negative encounters with others over a period of at least 2 years.^{14–16} In adult trauma patients, depression at the time of injury predicted worse support and social integration 12 months later.¹⁷ Finally, adults with diabetes assessed annually over a period of 4 years reported worse support at each assessment if they were depressed at the previous assessment.¹⁸

Despite these data from non-cancer populations, the influence of depression on long-term trajectories of social support among patients with breast cancer is largely unexplored. Depression affects roughly 20% of breast cancer patients and is a promising target for clinical intervention.¹⁹ Therefore, a better understanding of the relation between depression and social support in breast cancer patients has important clinical implications, particularly in light of the American Society of Clinical Oncology's recent adaptation of the pan-Canadian standard guidelines for the screening, assessment, and treatment of depression in patients with cancer.²⁰

Existing studies provide insights into the association between depression and social support, but also have methodological limitations. For instance, cross-sectional analyses preclude directional conclusions—namely, whether depression predicts low support.²¹ Only two studies to our knowledge have examined depression as a predictor of longitudinal support trends among breast cancer patients.^{8, 22} In one of these studies, Talley *et al.* (2010)²² assessed patients at three times—during their first week of radiation therapy and then again 3 and 6 months later—and observed that those with greater depressive symptomatology at each assessment reported declines in support at the subsequent assessment. However, the time frame of this study was short, limiting insight into long-term effects. The other, more recent study by Thompson *et al.* (2017)⁸ found that depression measured shortly after the start of neoadjuvant therapy in African American patients did not influence trends in perceived support over a period of 2 years. Furthermore, both studies obtained the baseline measure after the initiation of cancer treatment, impeding the applicability of their findings towards screening for depression at the time of diagnosis.

In the present study, we examined whether depression in women with newly-diagnosed breast cancer—assessed using a clinically relevant cutoff value for depressive symptomatology—impacts longitudinal trends in perceived social support within the 2 years following completion of primary treatment.

METHODS

Study Population and Procedures

This study represents secondary analyses of a completed study on neurocognitive functioning among postmenopausal women with newly-diagnosed breast cancer recruited at City of Hope from 2009–2012. Patient eligibility and enrollment procedures have been described in a prior publication.²³ Age-matched controls without cancer were recruited from residents in the nearby geographic regions who came to our center for routine mammogram screenings. Controls were recruited at the same time as patients and matched in the database with two patients of similar age (± 5 years) at baseline.

At the baseline visit, prior to initiation of local or systemic cancer treatment, patients completed assessments which included measures of depression and social support. Assessments were subsequently repeated at 1 month, 1 year, and 2 years following completion of primary treatment (surgery, radiation, and/or chemotherapy). Specifically, assessments were completed at the following median times (interquartile range) post-treatment: 36 days (21–60), 400 days (369.5–435.5), and 756 days (726–802.5). Controls were assessed at similar time intervals as the patients to whom they were matched.

The present analyses consist only of women who completed the relevant assessments at all four study timepoints. From the cohort enrolled in the larger study, 141 patients and 76 controls completed the baseline social support assessment since this measure was added after the study had already begun. From this group, 31 patients and 17 controls were excluded from analyses because they did not complete one or more of the subsequent three assessments, resulting in a final sample of 110 patients and 59 controls for this study.

Measures

Background Information—Race, age, marital status, education, and antidepressant usage was obtained via self-report. Breast cancer stage, therapies completed, and Charlson comorbidity index²⁴ was extracted from medical records.

Brief Symptom Inventory-18 (BSI-18)—The BSI-18 is a standardized, self-report questionnaire consisting of three subscales (somatization, anxiety, and depression) used to calculate a composite measure of global psychological distress.²⁵ It is widely used in clinical and research settings across various patient populations, with high reliability and validity in breast cancer patients.²⁶ At the baseline assessment, all participants completed the depression subscale (6 items). Participants were asked to rate on a Likert scale from 0 (“not at all”) to 4 (“extremely”) how much they experienced each item in the past week (e.g. “feeling blue”). An average raw score was calculated from these items and transformed into a T-score using published normative data in the administration manual.

Published recommendations for interpreting the BSI-18 in cancer samples have suggested T-score cutoff scores ranging from 50 to 63 as indicating significant scale elevation on each of the BSI scales, representing positive risk for distress symptoms or “caseness.”^{25, 27–29} In this study, we utilized a T-score 60 as a cutoff value to distinguish participants who reported depressive symptomatology within the top 16% of normative respondents (labeled “depressed”) —representing at least moderately elevated scores—compared to those scoring below this value (labeled “non-depressed”). A dichotomized measure was used to facilitate clinical interpretation of results, as clinicians typically use a standard cutoff for the BSI-18 and other mental health screening tools as a decision aid for triaging and allocating services to patients.

Medical Outcomes Study Social Support Survey (MOS-SSS)—The MOS-SSS is a standardized, self-report questionnaire that measures the perceived availability of four functional dimensions of social support: tangible, emotional/informational, affectionate, and positive social interaction.³⁰ We focused on tangible and emotional/informational support based on prior research supporting these as empirically distinct and highly relevant forms of support for women with cancer.^{21, 31–32} Specifically, tangible support refers to material or behavioral assistance to meet the demands of daily living or health-related responsibilities; emotional/informational support refers to displays of positive affect, compassion, empathic understanding, encouragement of emotional expression, and guidance and feedback to resolve one’s problems.³⁰ Participants completed the items on the tangible (4 items) and emotional/informational (8 items) subscales at all four assessments, and an average raw score was calculated from the subscale items, with higher scores reflecting greater perceived support.

Statistical Analysis

Scores on all continuous variables were checked for normality. Social support scores were negatively skewed at all time points (lowest skew = −1.273). Reverse natural log transformation was used to achieve normality, with higher transformed scores indicating higher support.

Conceptually relevant demographic factors (age, race, marital status, education) and clinical factors (comorbidity status, depression, breast cancer stage, treatment type, hormone therapy) were selected *a priori* to examine as potential covariates (Table 1).

Repeated-measures analysis of covariance (ANCOVA) was used in preliminary analyses to compare longitudinal trends in tangible and emotional/informational support between patients (n=110) and controls (n=59). This was done to confirm a prior report that patients have a different trend in support compared to individuals without cancer.⁸ For the primary analyses, repeated-measures ANCOVA compared longitudinal trends between depressed (n=25) and non-depressed (n=85) persons in the patient group only.

Analyses were conducted using IBM SPSS 24. All significance tests were two-tailed, alpha level .05.

RESULTS

Perceived social support in patients with breast cancer vs. age-matched non-cancer controls

Breast cancer patients had a higher percentage of non-Whites ($p=.001$) and lower education ($p<.001$) compared to controls. A greater percentage of patients were classified as depressed compared to controls ($p<.001$). Patients and controls did not differ by age, marital status, comorbidity status, or antidepressant usage (Table 1). Race and education were included as covariates in the preliminary analyses comparing trajectories of social support among patients versus controls.

Results showed a significant linear group $\times$ time interaction effect ($p=.045$) for tangible support (Table 2), such that support decreased among patients but increased among controls across the four assessments (Supplemental Figure). Perceived emotional/informational support followed the same general pattern as tangible support, as it decreased among patients but not controls across the four assessments (Supplemental Figure). The linear group $\times$ time interaction effect approached significance for emotional/informational support ($p=.098$) (Table 2).

Based on the observed decline in social support among breast cancer patients but not among controls, we proceeded with the primary analyses to examine whether patterns of support varied among patients as a function of pre-treatment depression status.

Perceived social support in depressed vs. non-depressed patients with breast cancer

Of the 110 breast cancer patients, 25 (22.7%) were classified as depressed based on their BSI-18 score at the baseline assessment. Depressed patients had a higher percentage of non-Whites ($p=.020$) and were younger ($p=.003$) compared to non-depressed patients. There were no other demographic or clinical differences between the two groups (Table 1). We controlled for age, race, and other key demographic and clinical factors (marital status, education, Charlson comorbidity index status, and breast cancer stage) in the analyses comparing longitudinal trends in social support among depressed versus non-depressed patients.

Results showed a significant cubic depression $\times$ time interaction effect ($p=.035$) for tangible support (Table 3). Non-depressed patients had stable tangible support across time; in contrast, depressed patients experienced a significant decline ($p=.004$) from 1 month ($M=4.28$, $SD=3.36$) to 1 year ($M=3.79$, $SD=3.39$) post-treatment, which remained unchanged between 1 and 2 years post-treatment ($p=.573$) (Figure 1A).

For emotional/informational support, there was a significant linear depression $\times$ time interaction effect ($p=.025$) (Table 3). Non-depressed patients had stable emotional/informational support across time; in contrast, depressed patients experienced a significant decline ($p=.013$) from 1 month ($M=4.21$, $SD=3.25$) to 1 year ($M=3.77$, $SD=3.21$) post-treatment, which remained unchanged between 1 and 2 years post-treatment ($p=.259$) (Figure 1B).

In sum, both tangible and emotional/informational support declined among depressed patients with breast cancer, but not among non-depressed patients, across the three follow-up assessments over a 2-year period. Specifically, depressed patients perceived a significant decline in both forms of support between 1 month and 1 year post-treatment, from which they did not recover at 2 years post-treatment.

Additionally, results showed significant main effects of depression ($p<.001$) and marital status ($p<.001$) on tangible support, such that depressed patients had lower support ($M=3.96$, $SD=2.75$) compared to non-depressed patients ($M=4.61$, $SD=1.18$), and non-married women ($M=4.15$, $SD=2.04$) had lower support compared to married women ($M=4.64$, $SD=1.34$).

Similar main effects of depression ($p=.002$) and marital status ($p=.004$) were observed for emotional/informational support, such that depressed patients had lower emotional/informational support ($M=3.93$, $SD=2.77$) compared to non-depressed patients ($M=4.45$, $SD=1.20$), and non-married women reported lower emotional/informational support ($M=4.09$, $SD=2.08$) compared to married women ($M=4.47$, $SD=1.37$).

DISCUSSION

Social support is an established predictor of clinical and psychosocial outcomes in women with breast cancer. Therefore, understanding and identifying risk factors for low perceived social support among patients is crucial for early intervention. Depression has established connection with social support in non-cancer populations, but this relation is understudied in women with breast cancer. This prospective, longitudinal study examined whether breast cancer patients with elevated levels of depressive symptomatology prior to treatment may exhibit characteristically different levels of social support in the 2 years following treatment compared to those without these symptoms.

Our analyses confirmed prior findings that the trajectory of social support in women with breast cancer is different than in women without cancer,⁸ as we found declines in perceived support among patients but relative stability in the non-cancer controls. Among the breast cancer patients, elevated depressive symptomatology at baseline was indeed a risk factor for declines in support, whereas non-depressed patients had high and stable support over time. Specifically, patients categorized as depressed experienced significant declines in both

tangible and emotional/informational support from 1 month to 1 year post-treatment completion; even at 2 years post-treatment they had reduced support compared to their pre-treatment levels.

Our findings contribute to a small literature documenting the changes in social support that occur as a function of depressive symptomatology among breast cancer survivors, which includes, to our knowledge, only two previous longitudinal studies.^{8, 22} Our study builds upon these studies by extending the follow-up period to 2 years post-treatment, covering the critical but relatively understudied “re-entry” phase of cancer survivorship (12–18 months post-treatment) during which targeted psychosocial interventions may produce the greatest long-term benefits for survivors.³³ It is worrisome that the depressed patients in our study reported both lower support compared to non-depressed patients as well as significant declines in support during this re-entry period, arguing for the potentially substantial impact of intervening in these patients’ lives before they transition into long-term survivorship.

Second, our study examined trends in two different types of perceived support given the prior empirical evidence suggesting that these two forms of support fulfill different needs and do not necessarily trend together among cancer survivors.^{34–35} Incidentally, we found that both support types followed nearly identical patterns across the four assessments in our study sample.

Previous research informs how depressive symptomatology can lead to poorer perceived support over time. Breast cancer is a life crisis that affects patients’ engagement with their social networks as they attempt to cope with sudden illness. At diagnosis and in the early stages of treatment, individuals in the social network may rally around the patient to offer immediate emotional and instrumental assistance, leading patients to initially perceive high levels of support.^{10, 36} Bolger *et al.* (1996)³¹ described an “erosion model” whereby initially supportive individuals proceed to withdraw their support when they feel overburdened by the toll of meeting the needs of individuals who remain distressed during a prolonged crisis period.

Why some patients perceive declines in support while others do not may be related to patients’ levels of psychological distress. Bolger *et al.* found that while emotional distress eroded support for patients with breast cancer, physical impairment mobilized support. These findings were corroborated by other research which showed that high psychological distress reduced support while physical problems increased support.^{21, 34} Bolger and colleagues surmised that these different responses may reflect discrepancies in how others perceive the controllability and addressability of patients’ emotional versus physical problems throughout the cancer experience.

Our study has several strengths. First, this is the longest longitudinal study to date, along with Thompson *et al.* (2017),⁹ of depressive symptomatology as a predictor of social support trends among breast cancer survivors. Moreover, our assessments occurred at key points along the breast cancer journey, covering pre-treatment, post-treatment, and the re-entry period of cancer survivorship. Second, we averted treatment confounds by assessing social support and depressive symptoms before treatment initiation, a method that has not been

done in most other studies. Third, our comparison of support trajectories between patients classified as “depressed” or “non-depressed” used a clinically relevant cutoff value, which confers practical applicability as a decision aid to clinicians as they triage services. Fourth, our inclusion of age-matched non-cancer controls to confirm differences in support trends among breast cancer survivors has been done in only one other study, but this study did not examine the role of depression on social support.⁸

CONCLUSIONS

In conclusion, we found that newly-diagnosed postmenopausal women with breast cancer who had elevated depressive symptomology prior to treatment initiation experienced declines in perceived tangible and emotional/informational support across three follow-up assessments in the 2 years following treatment completion. In contrast, patients who were not depressed had stable support levels during the study period.

Study Limitations

Some limitations of our study should be acknowledged. First, the size of our sample was relatively small, preventing us from adequately examining the contribution of treatment factors to support trends. While neither treatment type nor disease stage affected social support at any time point in our sample, we recommend that future research be sufficiently powered to assess these factors more thoroughly. Second, because only one participant in the control group was classified as depressed, we could not explore support trends as a function of depression in our control group; thus, we cannot conclude that the observed effects of depression were unique to the breast cancer group. Third, while the declines in support were statistically significant, our study cannot determine if these changes were clinically significant. Fourth, our results cannot generalize to pre-menopausal women, who may be a high-risk group given that younger patients in our study were more likely to be depressed. Importantly, it should be noted that the BSI-18 cutoff score to categorize patients as “depressed” by itself is insufficient to diagnose clinical depression and it is possible that the trajectory of social support might have differed had we applied different criteria. Finally, our findings may be improved by including other MOS-SSS subscales (e.g., affectionate support), which we did not administer to reduce respondent burden.

Clinical Implications

Our study adds to the literature by demonstrating that depressive symptomatology in the pre-treatment setting predisposes breast cancer patients to deteriorating social support following treatment. These results are distinct from other studies which show that deteriorating social support is predicted by depressive symptomatology assessed *during* or *after* treatment.^{21–22, 31, 37} Moreover, while prior work has shown that tangible support is less prone to erosion than emotional support,^{21, 35} we found that both forms of support erode in similar patterns for depressed patients. A major implication of our study, therefore, is that depressive symptomatology constitutes an important early interventional target at the time of breast cancer diagnosis.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Figure 1.

Perceived tangible and emotional/informational support among depressed vs. non-depressed patients with breast cancer. (A) Tangible support remained stable across the four assessments among non-depressed patients, but declined from 1 month to 1 year post-treatment ($p=.004$) among depressed patients, reflecting a significant cubic depression $\times$ time interaction effect ($p=.035$). (B) Emotional/informational support remained stable across the four assessments among non-depressed patients, but declined from 1 month to 1 year post-treatment ($p=.013$) among depressed patients, reflecting a significant linear depression

× time interaction effect ($p=.025$). Covariates: age, race, marital status, education, comorbidity status, breast cancer stage.

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Table 1.Characteristics of patients with breast cancer and age-matched non-cancer controls[‡]

	Patients (n=110)	Controls(n=59)	Depressed patients (n=25)	Non-depressed patients (n=85)
Age, mean (SD) [‡]	60.3 (7.1)	61.7 (7.6)	56.7 (5.3)	61.4 (7.2)
Race ^{*‡}				
White	62 (56.4%)	48 (81.4%)	9 (36.0%)	53 (62.4%)
Non-white	48 (43.6%)	11 (18.6%)	16 (64.0%)	32 (37.6%)
Marital status				
Married	71 (64.5%)	46 (78.0%)	13 (52.0%)	58 (68.2%)
Unmarried	39 (35.5%)	13 (22.0%)	12 (48.0%)	27 (31.8%)
Education [*]				
High school or less	36 (32.7%)	4 (6.8%)	8 (32.0%)	28 (32.9%)
Some college	38 (34.5%)	22 (37.3%)	8 (32.0%)	30 (35.3%)
College	19 (17.3%)	9 (15.3%)	5 (20.0%)	14 (16.5%)
Post-college	17 (15.5%)	24 (40.7%)	4 (16.0%)	13 (15.3%)
Charlson comorbidity status				
0	49 (44.5%)	32 (54.2%)	10 (40.0%)	39 (45.9%)
1	61 (55.5%)	27 (45.8%)	15 (60.0%)	46 (54.1%)
Depression [*]				
No	85 (77.3%)	58 (98.3%)		
Yes	25 (22.7%)	1 (1.7%)		
Antidepressant usage [§]				
No	79 (71.8%)	49 (83.1%)	15 (60.0%)	64 (75.3%)
Yes	31 (28.2%)	10 (16.9%)	10 (40.0%)	21 (24.7%)
Breast cancer stage				
0-I			15 (60.0%)	50 (58.8%)
II			6 (24.0%)	30 (35.3%)
III			4 (16.0%)	5 (5.9%)
Treatment type				
Surgery only			5 (20.0%)	18 (21.2%)
Surgery+Chemotherapy			2 (8.0%)	11 (12.9%)
Surgery+Radiation			8 (32.0%)	28 (32.9%)
Surgery+Chemotherapy+ Radiation			10 (40.0%)	28 (32.9%)

	Patients (n=110)	Controls(n=59)	Depressed patients (n=25)	Non-depressed patients (n=85)
Hormone/Endocrine therapy (Tamoxifen or Anastrozole) [¶]				
No			9 (36.0%)	21 (24.7%)
Yes			16 (64.0%)	62 (72.9%)
Not reported			0	2 (2.4%)

*
 $p < .05$, patients vs. controls

[†]
 $p < .05$, depressed vs. non-depressed patients

[‡] Baseline characteristics. Significance tests for categorical variables were Chi-square tests, for continuous variables were t -tests.

[§] At any study timepoint.

Table 2.

Effects of breast cancer status and time on perceived social support among patients with breast cancer vs. non-cancer controls

Support type		<i>F</i> (1, 165)	<i>p</i> value	Effect estimate (η^2)
Tangible support	Breast cancer [†]	.001	.971	<.001
	Time [‡]	.105 ^L	.747	.001
		.032 ^Q	.858	<.001
		.003 ^C	.955	<.001
	Breast cancer × time [§]	4.085 ^L	.045 [*]	.024
		.129 ^Q	.720	.001
		.752 ^C	.387	.005
	Emotional / informational support			
	Breast cancer [†]	.445	.505	.003
	Time [‡]	.003 ^L	.956	<.001
		1.563 ^Q	.213	.009
		.519 ^C	.472	.003
	Breast cancer × time [§]	2.772 ^L	.098	.017
		2.466 ^Q	.118	.015
		.009 ^C	.925	<.001

*
p < .05

[†] Between-group differences (patients vs. controls)

[‡] Within-group differences

[§] Between × within-group interaction effect

^L = linear trend

^Q = quadratic trend

^C = cubic trend

Covariates: race, education

Table 3.

Effects of depression status and time on perceived social support among depressed vs. non-depressed patients with breast cancer

Support type		<i>F</i> (1, 102)	<i>p</i> value	Effect estimate (η^2)
Tangible support	Depression [†]	18.031	<.001 [*]	.150
	Time [‡]	.174 ^L	.677	.002
		.193 ^Q	.662	.002
		1.880 ^C	.173	.018
	Depression × time [§]	3.087 ^L	.082	.029
		2.412 ^Q	.124	.023
		4.565 ^C	.035 [*]	.043
	Emotional / informational support			
	Depression [†]	10.106	.002 [*]	.090
	Time [‡]	.52 ^L	.473	.005
		.081 ^Q	.776	.001
		.521 ^C	.472	.005
	Depression × time [§]	5.206 ^L	.025 [*]	.049
		.93 ^Q	.337	.009
		2.559 ^C	.113	.024

^{*}
p < .05

[†] Between-group differences (depressed vs. non-depressed patients)

[‡] Within-group differences

[§] Between × within-group interaction effect

^L = linear trend

^Q = quadratic trend

^C = cubic trend

Covariates: age, race, marital status, education, comorbidity status, breast cancer stage