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Financial Strain and Physical and Emotional Quality of Life in Breast Cancer

Laura M. Perry, MS[1,*], **Michael Hoerger, PhD, MSCR**[1], **Katherine Seibert, BS**[2], **James I. Gerhart, PhD**[3], **Sean O'Mahony, MB, BCh, BAO**[4], **Paul R. Duberstein, PhD**[5]

[1]Tulane University, New Orleans, LA 70118, USA

[2]Albert Einstein College of Medicine, Bronx, NY 10461, USA

[3]Central Michigan University, Mt. Pleasant, MI 48859, USA

[4]Rush University Medical Center, Chicago, IL 60612, USA

[5]Rutgers University School of Public Health, Piscataway, NJ 08854, USA

Abstract

Context: Few studies have examined the association between financial strain and quality of life outcomes in breast cancer.

Objectives: To examine the association between financial strain and key elements of physical and emotional quality of life among women with breast cancer.

Methods: Across three geographically diverse samples (census regions: Northeast=13.2%, Midwest=26.8%, South=35.5%, West=17.4%; international=7.1%), 309 women with a history of breast cancer completed online surveys including measures of financial strain, depression, anxiety, symptom burden, and perceived health. The third sample (N=134) also reported financial toxicity that specifically documents financial strain due to medical care costs. Primary analyses assessed the association between financial strain and measures of emotional and physical quality of life. Sensitivity analyses examined associations using the measure of financial toxicity. All analyses controlled for key covariates.

Results: Results showed that 37.5% of women experienced financial strain (Samples 1–3), varying from 12.1% among older, married, and college-educated women to 81.0% among women who were younger, unmarried and lacked a college education. Additionally, 26.1% reported treatment-specific financial toxicity (Sample 3). Financial strain was associated with more severe symptoms of depression (p<.001) and anxiety (p<.001) and worse physical symptom burden (p<.001) and perceived health (p<.001). Observed effects were sustained in sensitivity analyses using the financial toxicity measure.

[*]**Correspondence:** Laura M. Perry, 3035 Stern Hall, New Orleans, LA 70118. lperry5@tulane.edu, Phone: 504-865-5331, Fax: 504-862-8744.

Conclusions: The present investigation illustrates the importance of financial strain in breast cancer. Healthcare systems are encouraged to expand interdisciplinary palliative and supportive care services that have the expertise necessary to help financially strained patients navigate the cancer care continuum.

Keywords

Breast Cancer; Financial Toxicity; Depression; Anxiety; Symptom burden; Perceived health

Background

Breast cancer has the highest incidence and mortality rates among women of all cancers worldwide, and many patients experience financial strain (i.e., lacking the financial resources necessary to meet basic needs) [1] that undermines cancer care outcomes. Estimates of financial strain in breast cancer range from 13% in studies in Austria [2] and Sweden [3] to 50% in one U.S. study [3, 4], with most estimates near the middle (U.S.: 20–44%, Lithuania: 40%) [5-7]. Sources of financial strain include costs associated with cancer care services (e.g., medication, co-pay, transportation), and reduced income due to missing work, loss of employment or retirement [8]. Financial strain is stressful and may reduce emotional quality of life [3, 6, 9, 10]. It is also associated with earlier mortality and reduced physical quality of life, partly because individuals may be unable to continue paying for expensive treatment regimens [4-6, 8, 10-15]. However, studies are needed examining financial strain as the primary independent variable of interest [4, 6], with a multi-item scale [4], and in combination with a comprehensive assessment of quality of life [5].

In the present study we examined the cross-sectional associations between a four-item measure of financial strain [1] and key elements of emotional and physical quality of life. To achieve greater power and examine the replicability of findings across samples, we combined data from three samples of women with breast cancer. For sensitivity analyses in the third sample, we also included a more targeted measure of ‘financial toxicity’ [8, 16] that focuses on financial strain specifically attributed to treatment costs. We hypothesized that financial strain and toxicity would be associated with worse quality of life.

Methods

Participants and Procedures

Three samples of women with breast cancer (Total N=309; Sample 1: N=55; Sample 2: N=120; Sample 3: N=134) participated in this research, conducted from 2011–17. Participants with a history of breast cancer were recruited using the NIH ResearchMatch database [17]. Our study website was open-access and was also made available on breast cancer websites and listservs, and via informal word of mouth. Participants completed a consent document prior to the survey, and procedures were identical except where noted. For example, in Sample 1 only, participants could enter into a lottery for $100 for participating. The inclusion criteria were having a current or past diagnosis of breast cancer, being female, and being at least 18 years of age. Patients unable to read English were excluded. Study procedures were conducted with all necessary approvals from ResearchMatch, NIH, and the

relevant Institutional Review Boards at the James P. Wilmot Cancer Institute (ethical approval # RSRB00037941) and Tulane University (ethical approval #16–959396UE and #2017–723).

Assessments and Measures

Health history and demographic data.—Participants reported the recency of diagnosis (months), presence of metastases, and type of cancer treatments received. Demographic variables included age, education level, marital status, race, and geographic location.

Financial strain.—We used a four-item checklist [1] that asks participants to indicate whether their income is sufficient to allow them to afford: (1) food and housing, (2) clothing, medicine, home repairs, (3) going out for a meal and entertainment, and/or (4) a week-long vacation, health permitting. Participants were classified as financially strained if they indicated that they could not afford one or more of the four options. The measure has been used previously in a large sample of older adults in the U.S. [1].

Financial toxicity.—Financial toxicity was assessed, in Sample 3 only, using an item from the financial domain of the Patient Satisfaction Questionnaire rated from 1 *(strongly disagree)* to 5 *(strongly agree):* "I have to pay for more of my medical care than I can afford" [18]. Presence of financial toxicity was determined if participants rated the item a 4 or 5 *(agree or strongly agree)*. Prior research has established the validity of this question in cancer [19].

Emotional quality of life.—Sample 1 participants completed the depression and anxiety subscales of the Depression Anxiety Stress Scale (DASS) [20]. The validity of the DASS is well-established, including in cancer samples [20, 21] and both the depression (α=.86) and anxiety (α=.69) scales were reliable in the present sample. Given growing interest [22] in the Patient- Reported Outcome Measurement Information System (PROMIS), participants in Samples 2 and 3 completed the PROMIS depression scale, and Sample 3 also completed the PROMIS anxiety scale [23]. The anxiety measure was omitted in Sample 2 to accommodate ancillary measures for other studies. The PROMIS depression and anxiety scales have shown evidence of reliability and validity [22, 23], and were reliable in the present samples (αs from .90 to .94).

Physical quality of life.—Participants in all three samples completed the SF-1 perceived health item [24] and the physical symptom subscale of the Functional Assessment of Cancer Therapy-General (FACT-G) [25]. Both have been used extensively in prior studies [26, 27] and the FACT-G was reliable here (α=. 87).

Analysis

First, we examined descriptive statistics for each variable. Chi-Square tests of independence were used to examine whether demographic or health history variables had significant zero-order associations with financial strain. In each sample, analyses of covariance (ANCOVAs) were used to examine whether financial strain (independent variable) was associated with each quality of life outcome (PROMIS Depression, SF-1, etc.), while controlling for of age,

education level (presence/absence of Bachelor's degree), marital status (married versus unmarried), presence/absence of metastases, and recency of diagnosis (≤1 year versus longer). We calculated the sample-size weighted average effect for these outcomes across all participants, which afforded greater power than the within-sample analyses. In sensitivity analyses involving the financial toxicity measure included in Sample 3, we used ANCOVA models comparable to our primary analyses to examine whether presence of financial toxicity (independent variable) was associated with each quality of life variable (dependent variable) while controlling for the covariates. Effect sizes were assessed using the standardized mean difference, Cohen's *d* [28], which were computed by hand from covariate-adjusted means and standard deviations from the ANCOVA.

Results

Demographics

Participants were 309 female breast cancer patients who ranged in age from 27 to 86 (see Table 1). Most held at least a bachelor's degree (72.6%), were married (59.0%), and were white (94.9%). They were geographically distributed across 40 U.S. states (census regions: Northeast=13.2%, Midwest=26.8%, South=35.5%, West=17.4%) and internationally (7.1%). The median time since initial diagnosis was 5 years, with 19.1% in the past year and 24.2% at least 10 years prior. Approximately 1 in 5 reported metastases. Their treatment regimens included surgery (73.5%), chemotherapy (60.3%), radiation (61.9%), biologic/targeted therapy (14.5%), or no treatments (3.8%).

Financial Strain and Toxicity

Table 1 shows that 37.5% of the total sample reported financial strain. Participants who were older (p=.011), married (p<.001), or had a Bachelor's degree (p=.001) were less likely to experience financial strain (see Table 2). Based on these demographics, the prevalence of financial strain in the lowest-risk subgroup (married, college-educated, and ≥65) was 12.1%, whereas the prevalence in the highest-risk subgroup (unmarried, not college-educated, and <65) was 81.0%. Financial toxicity was present in 26.1% of Sample 3.

Emotional Quality of Life

Financial strain was associated with worse emotional quality of life in all three samples (see Table 3), while accounting for the effects of age, education level, marital status, recency of diagnosis, and presence of metastases. In specific, financial strain was associated with greater depression (average d=0.70, p<.001) and anxiety (average d=0.51, p<.001) symptom severity (see Table 4). Older participants reported better emotional quality of life. They reported lower levels of depression in Samples 2 and 3 (ps≥.048) and lower anxiety in Samples 1 and 3 (ps≤.012). More recently diagnosed participants had increased anxiety in Sample 1 (p=.044), and those without a bachelor's degree had increased depression and anxiety in Sample 3 (ps≤.023). Sensitivity analyses in Sample 3 were consistent with our primary analyses. Financial toxicity was associated with symptoms of depression (d=0.83, p<.001) and anxiety (d=0.81, p<.001) while controlling for the same covariates.

Physical Quality of Life

Financial strain was associated with two indicators of physical quality of life (see Table 3) while controlling for the same covariates in three samples. Specifically, financial strain was associated with worse perceived health (average d=0.57, p<.001) and greater physical symptom burden (average d=0.60, p<.001; see Table 4). Presence of metastases was associated with greater symptom burden in Sample 2 (p=.002). In Sample 3, individuals with a bachelor's degree reported better physical quality of life on both measures (ps≤.025) and older individuals had better perceived health (p=.030). In sensitivity analyses, Sample 3 participants who experienced financial toxicity also reported worse perceived health (d=0.61, p=.005) and worse symptom burden (d=0.46, p=.025). Older individuals and those with a bachelor's degree reported better physical quality of life on both measures (ps≤.044).

Discussion

Nearly two in five (37.5%) women with breast cancer in this sample experienced financial strain. We found that financial strain is associated with worse emotional and physical quality of life. Financial strain was most common (81.0%) among unmarried, younger women who lacked college degrees. Findings from Sample 3 suggest that some of the financial strain experienced by women with breast cancer could be directly attributed to the cost of medical care. Findings emphasize the importance of socioeconomic inequalities in quality of life in breast cancer and have implications for the prioritization and allocation of services.

Whereas prior research has shown that financial strain is associated with single components of quality of life in breast cancer [2-4], we observed the detrimental effects of financial strain across multiple components of quality of life and several assessment instruments. Averaging across our samples, financial strain was associated with scoring more than 2/3 of a standard deviation higher on depression symptoms and about 1/2 of a standard deviation higher on anxiety symptoms. Women who were financially strained also experienced 2/3 of a standard deviation worse symptom burden and perceived their health to be more than 1/2 of a standard deviation poorer compared to women who were not financially strained. These are considered "medium" effects [28], comparable to the magnitude reported in recent meta-analyses for the impact of common mental health treatments on emotional quality of life [29, 30], and larger than the effect sizes reported for the impact of palliative cancer care interventions on physical quality of life [31, 32]. Thus, the impact of financial strain could be profound and the broader context of patient resources and financial strain are important to address in clinical care [33].

Study Limitations

Most participants were white, married, and college educated, and all could read English. Also, Sample 1 had a small sample size (N=55). However, to partly account for these issues, we reported several descriptive analyses for demographic subgroups (see Table 2), and pooled results from all three samples (see Table 4). Furthermore, most participants were from the U.S., and patients in other countries that have stronger social safety nets may experience less strain [2, 3]. Finally, this was a cross-sectional online survey that used short measures of financial strain and toxicity, and estimates may have been prone to sampling or

self-report bias. To draw causal, generalizable inferences, future studies should use more representative samples, a comprehensive and validated measure of financial burden [34], and longitudinal designs. Nevertheless, the present investigation was unique in using multiple measures of financial strain and assessing multiple aspects of physical and emotional quality of life. Furthermore, analyses controlled for potential confounders and replicated several results across three independent samples. It was also encouraging to note that our findings on financial strain were consistent in sensitivity analyses in the third sample using a treatment-specific measure of financial toxicity, suggesting that reduced quality of life experienced by financially strained participants can at least be partly attributed to the direct costs of medical care burdening women with breast cancer.

Clinical Implications

Our findings have implications for interventions aimed at improving quality of life for financially strained patients with cancer. At the policy level, these findings suggest the importance of mitigating the financial burden of cancer, perhaps by expanding access to quality and affordable health insurance, improving family and medical leave policies, or otherwise strengthening the social safety net in the U.S. Although policy-level changes could have a broad impact, they are potentially the most controversial and difficult to achieve [16, 35]. Healthcare systems, especially those serving low-income populations, can take smaller steps such as providing free transportation, legal services, or financial counselors [36-38]. As well, they could expand programs designed to improve quality of life [16] through expanded access to multidisciplinary palliative care teams and supportive care services. [39, 40].

In conclusion, the present investigation showed that financially strained women with breast cancer experienced worse emotional and physical quality of life. Findings suggest the importance of interventions to reduce the financial burden of cancer and improve quality of life.

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Table 1

Participant Characteristics (N=309)

Characteristic	*M* (*SD*)	or *n* (%)
Age, years	58.31	(11.07)
Education, Bachelor's degree or higher	224	(72.5%)
Metastases, present	58	(18.8%)
Recent Diagnosis, past year	59	(19.1%)
Relationship Status, married	183	(59.2%)
Financial Strain, present	116	(37.5%)
Financial Toxicity, present[a]	46	(26.6%)

Note. *N*=309.

[a]Sample 3 data only (*n*=134).

Table 2

Point Prevalence of Financial Strain within Demographic and Health Subgroups

	Financial Strain Absent (*N*=193)		Financial Strain Present (*N*=116)		
Characteristic	**n**	**(%)**	***n***	**(%)**	***p***
Age					
<65	127	(58.0%)	92	(42.0%)	.011
≥65	66	(73.3%)	24	(26.7%)	
Marital Status					
Unmarried	61	(48.4%)	65	(51.6%)	<.001
Married	132	(72.2%)	51	(27.8%)	
Education					
Bachelor's absent	41	(48.2%)	44	(51.8%)	.001
Bachelor's present	152	(67.9%)	72	(32.1%)	
Time since diagnosis					
≤ 1 year	28	(52.8%)	27	(47.2%)	.112
> 1 year	165	(64.5%)	91	(35.5%)	
Metastases					
Absent	155	(61.8%)	96	(38.2%)	.594
Present	38	(65.5%)	20	(34.5%)	

Note. *N*=309 across three samples. *P*-values were obtained from Chi-Square tests of independence to examine the zero-order association between each participant characteristic (dichotomous variable) and presence of financial strain (dichotomous variable).

Table 3

Financial Strain and Quality of Life in Breast Cancer

Quality of Life Measures	Financial Strain Absent (*n*=193) *M*	*(SD)*	Financial Strain Present (*n*=116) *M*	*(SD)*	Standardized Mean Difference (Cohen's *d*)	*p*
Sample 1 (*N*=55)	*n*=32		*n*=23			
Emotional						
Depression Symptom Severity (DASS)	2.81	(2.83)	5.35	(4.03)	0.77	.008
Anxiety Symptom Severity (DASS)	2.19	(2.75)	3.09	(2.56)	0.32	.253
Physical						
Perceived Health (SF-1)	3.53	(1.08)	3.04	(0.77)	0.74	.011
Physical Symptom Burden (FACT-G)	1.08	(0.91)	1.61	(0.98)	0.50	.080
Sample 2 (*N*= 120)	*n*=84		*n*=36			
Emotional						
Depression Symptom Severity (PROMIS)	2.18	(2.81)	5.00	(3.93)	0.85	<.001
Physical						
Perceived Health (SF-1)	3.54	(0.87)	2.97	(0.97)	0.50	.021
Physical Symptom Burden (FACT-G)	0.55	(0.65)	1.21	(0.94)	0.80	<.001
Sample 3 (*N*= 134)						
Emotional	*n*=77		*n*=57			
Depression Symptom Severity (PROMIS)	1.62	(2.80)	3.91	(3.84)	0.53	.004
Anxiety Symptom Severity (PROMIS)	2.57	(2.82)	5.49	(4.48)	0.59	.002
Physical						
Perceived Health (SF-1)	3.49	(0.96)	2.81	(0.90)	0.56	.003
Physical Symptom Burden (FACT-G)	0.55	(0.65)	1.22	(0.94)	0.66	<.001

Note. DASS = Depression Anxiety Stress Scale (summated score for depression and anxiety computed from 7 items rated from 0–3) [22]. SF-1 = first item from the Short Form Health Survey (rated from 1–5) [26]. FACT-G = Functional Assessment of Cancer Therapy - General (mean composite of 7 symptom items rated from 0–4) [27]. PROMIS = Patient Reported Outcome Measurement Information System (summated score for depression and anxiety computed from 4 items rated from 0–4) [25]. Financial strain in each sample was assessed using a four-item checklist [3]. Means and standard deviations are unadjusted for covariates. The standardized mean difference and significant test control for age, education level, presence/absence of metastases, and time since diagnosis.

Table 4

Meta-Analysis of Effect Sizes for the Associations between Financial Strain and Indicators of Quality of Life in Three Samples of Patients with Breast Cancer

Quality of Life Indicator	Measures	Studies	*N*	Standardized Mean Difference (Cohen's d)	*p*
Depression Symptom Severity	PROMIS, DASS	1, 2, 3	309	0.70	<.001
Anxiety Symptom Severity	PROMIS, DASS	1, 3	189	0.51	<.001
Perceived Health	SF-1	1, 2, 3	309	0.57	<.001
Physical Symptom Burden	FACT-G	1, 2, 3	309	0.67	<.001

Note. PROMIS = Patient Reported Outcomes Measurement Information System [25]. DASS = Depression Anxiety Stress Scale [22]. SF-1 = first item from the Short Form Health Survey [26]. FACT-G = Functional Assessment of Cancer Therapy - General [27]. Cohen's *d* values reflect the sample-size weighted average values across samples. All analyses control for age, education level, presence/absence of metastases, and time since diagnosis.