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## Predictors of Work-Related Disability During Early Phases of Breast Cancer Treatment

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### Abstract

**Objective:** This study examined the magnitude of work-related disability in post-menopausal women with breast cancer compared to healthy controls. It also examined demographic and clinical correlates of work-related disability in post-menopausal women with breast cancer.

**Study Design:** Exploratory secondary analysis of longitudinal study.

**Outcome Measure:** The Work Limitations Questionnaire measured the percentage of at-work productivity loss.

**Results:** The analysis revealed a significant group by time interaction effect ( $F(1,40)=4.705$ ,  $p=.036$ , partial  $\eta^2=.105$ ) on work-related disability. Participants with breast cancer ( $M=2.364$ ,  $SE=.374$ ) had significantly higher percentage of at-work productivity loss compared to the healthy control group ( $M=1.263$ ,  $SE=.392$ ). At baseline, cognitive-emotional symptoms were moderately to strongly associated with work-related disability. At 6 months, physical symptoms were moderately associated with work-related disability.

**Conclusions:** Newly diagnosed women with breast cancer are likely to experience higher rates of work-related disability compared to health counterparts. Healthcare providers should provide intervention to parallel the shift in symptoms which lead to higher work-related disability and job cessation

### Keywords

work; disability; employment; cancer

## Introduction

Breast cancer is the most prevalent cancer in women, and nearly 60% of women diagnosed are of working age.<sup>1</sup> Treatment advances, including less aggressive surgeries and outpatient adjuvant therapy, make it possible for women with breast cancer to remain working throughout treatment. Work is beneficial, providing a sense of purpose, minimized financial burden, and improved self-esteem.<sup>2</sup>

To date, studies examining cancer and work have focused on long-term survivorship.<sup>3</sup> There is limited information evaluating factors associated with work-related disability for women with breast cancer who choose to remain working throughout treatment.<sup>3,4</sup> Work-related disability includes changes in physical, emotional, and cognitive capacities, interpersonal skills, and time management that may lead to changes in job performance or productivity. A non-systematic review suggested that persons receiving treatment for cancer have greater work-related disability compared to healthy controls.<sup>3</sup> In addition, studies report that increased work-related disability is associated with treatment-related side effects.<sup>5-7</sup>

Evidence regarding work-related disability is limited by a lack of validated assessment tools measuring the concept. The Work Limitations Questionnaire may offer a solution.<sup>3,8</sup> This tool, combined with an understanding of demographic and clinical factors associated with work-related disability, may inform treatment strategies for women with cancer who are experiencing problems but would like to remain working during treatment.<sup>3,4</sup>

The current study assessed the prevalence of work-related disability and examined demographic and clinical factors associated with work-related disability in postmenopausal women who remained working throughout treatment for early stage breast cancer.

## Methods

### Study Design

This is a secondary analysis of a longitudinal cohort study.<sup>9</sup> The primary study examined cognitive function and outcomes among post-menopausal women with breast cancer receiving the aromatase inhibitor, anastrozole. The design of this study has been fully described elsewhere.<sup>9</sup>

### Study Sample

The primary study recruited postmenopausal women newly diagnosed with breast cancer (Stages I, II, or IIIa) from a National Cancer Institute-designated Comprehensive Cancer Center between 2005 and 2012. Participants were enrolled after primary surgery and prior to initiation of chemotherapy and/or anastrozole therapy. They were younger than 75 years, able to read and speak English, and had eight years or more of education. Women with a history of neurological illness, psychiatric hospitalization within 2 years, previous cancer diagnosis, or evidence of metastases were excluded. Age- and education-matched controls with no prior history of cancer were also recruited.<sup>9</sup> All participants provided written informed consent. The primary study and secondary analysis were approved by the University Institutional Review Board.

Participants who were employed and completed the Work Limitations Questionnaire at baseline and 6-month assessments were included in the secondary analysis. For participants with cancer, assessments were completed at baseline and 6 months after initiation of adjuvant chemotherapy or anastrozole treatment. The control group was assessed at study admission and 6 months later.

## Measures

The Work Limitations Questionnaire (WLQ)<sup>10</sup> is characterized by percentage of at-work productivity loss. Twenty-five items examined difficulty performing physical, emotional, and job-specific tasks on a 5-point Likert scale, ranging in scores from 1 –5. Higher scores indicated greater difficulty or decreased frequency to complete a job task. The average score in each subscale was weighted and summed following validated procedures to form a WLQ Index Score which was converted to a percentage score of at-work productivity loss [ $1 - \text{exponent}(-\text{WLQ Index Score})$ ].

For breast cancer and healthy control participants, we examined age, years of education, marital status, type of occupation, and race, as well as depressive symptoms (Beck Depression Inventory II)<sup>11</sup>, anxiety symptoms (Profile of Mood States – 2: Tension/Anxiety Subscale),<sup>12</sup> self-reported cognitive and physical function (Patient Assessment of Own Functioning Inventory),<sup>13</sup> and fatigue (Epworth Sleepiness Scale).<sup>14</sup>

## Statistical Analyses

Descriptive analyses summarized participant characteristics. Chi-square, *t*-test and non-parametric alternatives were used to compare the women with breast cancer and healthy controls. A  $2 \times 2$  repeated measures analysis of variance (ANOVA) (IBM SPSS Statistics for Windows, Version 24.0) compared work-related disability between breast cancer and control groups. Normality was evaluated by the Shapiro-Wilk test and visual analysis of box plots. The Greenhouse-Geisser test was used to adjust for any violation of compound symmetry. Estimated marginal means were used to interpret significant interaction effects. Spearman rank correlational analyses examined correlates of work-related disability and participant characteristics in women with breast cancer. The significance level was set at .05.

## Results

Table 1 shows baseline characteristics of participants. The analysis included a total number of 45 participants. Among the women with breast cancer, 37 had complete baseline and only 24 had complete data at 6 months. There were no statistically significant differences in baseline characteristics between participants with partial and complete data. Among participants with complete data, there was a greater proportion who had managerial or administrative occupations (54%) compared to participants with baseline data only (38%). Of the 24 participants with breast cancer, mean age was  $61.1 \pm 1.1$  years old, mean education was  $14.2 \pm .7$  years, and a higher proportion were Caucasian and married. The majority of participants with breast cancer had a Stage I diagnosis and anastrozole therapy only. The healthy control group had a mean age of  $59.6 \pm 5.5$  years, mean education of  $15.9 \pm 2.9$  years, were predominantly Caucasian and married. There were no significant differences between

the participants with breast cancer and healthy controls on any demographic and clinical characteristics.

The ANOVA revealed a significant group (breast cancer versus healthy control) by time (baseline and 6 months) interaction effect ( $F(1,40)=4.705, p=.036$ , partial  $\eta^2=.105$ ) on work-related disability (See Figure 1). Participants had significantly higher work-related disability at baseline ( $M=2.303, SE=.373$ ) compared to 6 months later ( $M=1.323, SE=.263$ ) demonstrating a significant decrease in work-related disability over time. There was also a significant main effect of group ( $F(1, 40)=4.135, p=.049$ , partial  $\eta^2=.094$ ). Participants with breast cancer ( $M=2.364, SE=.374$ ) had significantly higher work-related disability compared to the healthy controls ( $M= 1.263, SE= .392$ ). A post-hoc power analysis indicated power of 99.34%.

Of each demographic and clinical characteristic described in Table 1, work-related disability in women with breast cancer was moderately to strongly associated with depressed mood and cognitive challenges at baseline (Table 2). Similarly, at 6 months, correlates of work-related disability was strongly associated with physical limitations, specifically problems with use of hands and sensory/perceptual impairments. In this sample, no other social and demography or clinical characteristic was significantly associated with work-related disability at either time point.

## Discussion

Based on the current sample, it appears that Caucasian, middle-aged women working in managerial, administrative, or clerical work are at risk for work-related disability due to systemic adjuvant therapy. Although the average percentage of at-work productivity loss in women with breast cancer was low, the participants with breast cancer had higher work-related disability compared to the healthy controls over time.<sup>15,16</sup> Compared to cancer survivors who may require a leave of absence from work due to cancer, this group of participants may have had a better prognosis<sup>17</sup>, better management of treatment side effects, and greater social support<sup>4</sup> explaining lower magnitude of work-related disability. As identified in the parent study, there were 13 participants who were no longer working after the initiation of adjuvant therapies, and therefore excluded from the current analysis. The change in employment may indicate more severe work-related disability due to intolerable effects of the anastrozole therapy, such as pain, fractures, and dyspareunia.<sup>19</sup> This requires further investigation.

Prior to anastrozole treatment, work-related disability was strongly associated with cognitive-emotional symptoms such as depressive symptoms and fatigue. Studies suggest that cancer survivors required a time to adjust or cope with the onset of illness and management of ongoing responsibilities.<sup>15</sup> During the acute phases of survivorship, nearly half of women with breast cancer experience depression, anxiety, stress and adjustment difficulties which impact performance in day-to-day activities including work.<sup>16</sup> Unlike healthy counterparts, adjustment to and management of cancer and related sequelae, both cognitive-emotional and physical in nature, may be one hypothesis as to why there is greater work-related disability during the in the study group.

Women with breast cancer reported a shift in clinical factors associated with work-related disability over time. Six months after the initiation of systemic adjuvant therapy, physical side effects such as sensory-perceptual concerns and upper extremity impairment were more strongly associated with work-related disability. In post-menopausal women with breast cancer, physical side effects may increase in frequency and intensity because of job demands and ongoing stress.<sup>15</sup>

While additional research is needed to disentangle the shift in cognitive-emotional to physical correlates of work-related disability, it is important for treating physicians and rehabilitation staff monitor the impact of treatment on important daily activities such as work and to do so over time. Prior to treatment, it may be more beneficial to educate patients on coping strategies, stress reduction techniques, and energy conservation to address cognitive-emotional symptoms associated with work-related disability. In addition, current literature suggests that referral to cognitive-behavioral based treatments<sup>20,21</sup> and mindfulness-based stress reduction<sup>22</sup> offer structured and efficacious approaches which reduce mood symptoms and cognitive impairment. Provision of cancer prehabilitation at the onset of diagnosis improves both psychosocial and physical symptoms impacting function in patients undergoing cancer treatment.<sup>23</sup> As patients undergo treatment, education on environmental adaptations as well as sensory and strengthening exercises to address physical symptoms may be more beneficial. To reduce the psychosocial, physical, economic burden that cancer places upon the individual and society, we must consider providing educational resources and therapeutic referrals that parallel the shift in symptoms which lead to higher work-related disability and job cessation.

Furthermore, work is only one activity impacted by cancer, and assessment of other functional limitations (i.e. self-care, leisure, instrumental activities of daily living) should be evaluated to determine impact of initial diagnosis and treatment on all daily activities. Disability in daily activities has been associated with reduced quality of life and poor health.<sup>24</sup> By assessing disability in daily activities, treatment that influences long-term health and quality of life in women with breast cancer may be beneficial.

## Limitations and Future Directions

Homogeneity of race and education and heterogeneity in cancer stage and use of adjuvant chemotherapy limits the generalizability of the findings. Given the small sample size of this secondary analysis, future studies would also benefit from a larger sample size to improve reliability and generalizability of the findings. Future research studying the impact of work-related disability in women with breast cancer who remain working throughout treatment should include a broader age range to represent the 51% of women diagnosed with breast cancer who are under the age of 59 years.<sup>1</sup> Participant's in the study were nearing retirement and may have different experiences than younger working women. Limited representation of managerial, executive, and manual labor jobs may also limit the application of results to those who may experience different job roles and responsibilities which experience varying occupational barriers. Given that there were 13 participants with cancer who stopped employment from baseline to 6 months, it would be equally important to review the challenges leading to change in employment status. Future analyses should also collect

information regarding environmental factors such as social support, environmental barriers, and assistive technology use, which may impact prevalence of work-related disability and account for alternate hypotheses explaining differences in work-related disability between groups.

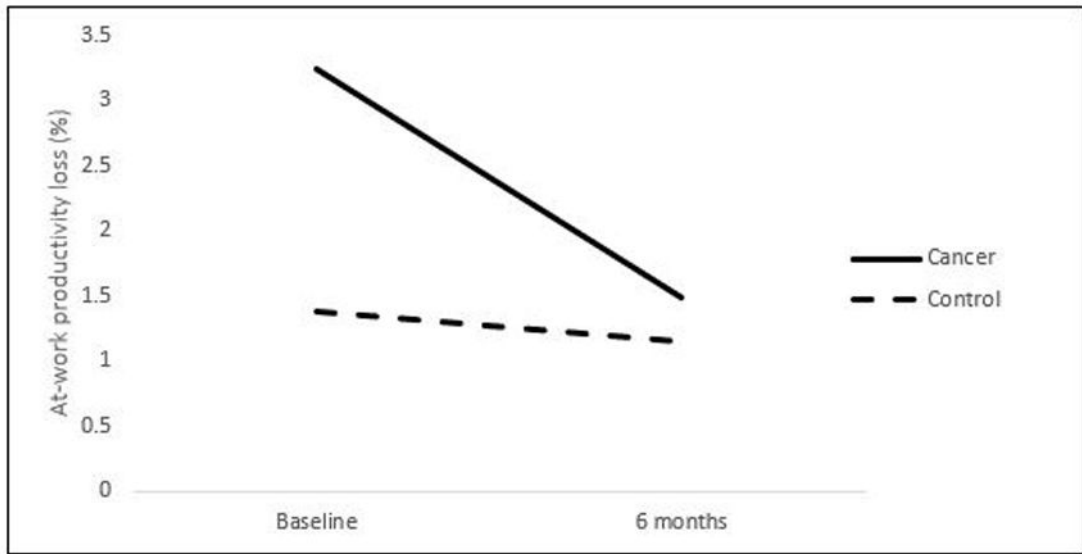
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**Figure 1.** Two-by-two analysis of variance showing significant interaction effect between women with breast cancer and healthy controls

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Table 1.

## Demographic and clinical characteristics of participants

Characteristics n (%) or Mean (SD)	HC Baseline (N = 21)	BC Baseline (N = 24)	BC 6 months (N = 24)
Stage of Breast Cancer			
Stage I	--	14 (58.3%)	--
Stage IIa	--	8 (33.3%)	--
Stage IIb	--	1 (4.2%)	--
Stage IIIa	--	1 (4.2%)	--
Cancer Treatment			
Chemotherapy and Anastrozole	--	5 (20.8%)	--
Anastrozole Only	--	19 (79.2%)	--
Race - Caucasian	18 (86%)	23 (95.8%)	--
Marital Status - Married	12 (57%)	17 (70.8%)	--
Occupation			
Higher Executives, Business Owner	0 (0%)	0 (0%)	--
Managers; Graduate Degree Career	6 (27.3%)	2 (8.3%)	--
Administrative Personnel	7 (31.8%)	11 (45.8%)	--
Clerical and Sales	5 (22.7%)	8 (33.3%)	--
Skilled Manual Labor	0 (0%)	1 (4.2%)	--
Semi-skilled Apprentice	0 (0%)	2 (8.3%)	--
Unskilled Manual Labor	0 (0%)	0 (0%)	--
Student or Disabled	4 (18.2%)	0 (0%)	--
Age (years)	59.6 (5.5)	61.1 (1.1)	--
Education (years)	15.9 (2.9)	14.2 (.7)	--
Number of Children	1.5 (.1)	1.5 (.3)	--
Number of Surgeries	--	1.2 (.1)	--
Epworth Sleepiness	--	5.8 (.6)	4.8 (.58)
BDI-II <sup>a</sup> - Total Score	3.2 (1.7)	5.2 (1.0)	4.2 (1.2)
PAOFI <sup>b</sup>			
Memory	.70 (.2)	.56 (.1)	.67 (.14)

Characteristics n (%) or Mean (SD)	HC Baseline (N = 21)	BC Baseline (N = 24)	BC 6 months (N = 24)
Language and Communication	.51 (.1)	.62 (.2)	.57 (.13)
Use of Hands	.08 (.03)	.14 (.1)	.11 (.04)
Sensory Perception	.05 (.05)	.41 (.2)	.20 (.08)
Higher Cog Function	.24 (.1)	.25 (.1)	.24 (.10)
POMS-II <sup>c</sup> -Tension Anxiety Subscale	.56 (.1)	.86 (.3)	.79 (.13)
WLQ <sup>d</sup> - Work Productivity Loss (%)	.78 (.4)	3.1 (.87)	1.15 (.46)

<sup>a</sup>Beck Depression Inventory-II;

<sup>b</sup>Patient's Assessment of Own Functioning Inventory;

<sup>c</sup>Profile of Mood States-II;

<sup>d</sup>Work Limitations Questionnaire

HC = Healthy Controls; BC = Women with Breast Cancer

Note: There were no significant differences ( $p < .05$ ) between BC and HC groups

Table 2.

Correlates of work-related disability in women with breast cancer

	<u>r</u>	<u>p</u>
<u>Baseline</u>		
Sensory Perceptual	-.031	.884
Use of Hands	.074	.730
Higher Level Cognitive Skills	.509	.011*
Depressive Symptoms	.467	.021*
Anxiety Symptoms	.641	.001*
Fatigue	.504	.012*
<u>6 months</u>		
Sensory Perceptual	-.806	.001*
Use of Hands	-.598	.031*
Higher Level Cognitive Skills	-.131	.669
Depressive Symptoms	.335	.118
Anxiety Symptoms	.331	.270
Fatigue	.405	.055

\* p&lt;.05