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Fatigue-Based Subgroups of Breast Cancer Survivors with Insomnia

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Abstract

The purpose of this study was to determine if breast cancer survivors (BCS) with insomnia can be grouped according to their level of fatigue. A secondary data analysis was conducted on baseline data obtained from a randomized clinical trial that focused on a cognitive-behavioral intervention for insomnia in BCS. Participants were breast cancer survivors (n=86) with insomnia who were at least 3 months post completion of primary treatment without current evidence of disease. Three subgroups of women were identified with significant differences in fatigue, including: Exhausted (35%), Tired (41%), and Restored (24%). Results suggest a majority of women have moderate-to-severe fatigue many years post completion of treatment. Severe fatigue was associated with higher levels of other symptoms and poorer quality of life (Exhausted subgroup). Significant differences in insomnia severity, anxiety, depression, and quality of life were noted among the Exhausted, Tired and Restored subgroups. The existence of fatigue-based subgroups offers important information when providing care to BCS. By determining symptoms associated with fatigue, patient care will benefit through a shift in focus from treatment of a single symptom such as fatigue to the delivery of a tailored intervention that targets multiple symptoms.

Fatigue-Based Subgroups of Breast Cancer Survivors with Insomnia

One of the most frequently reported problems among women who have survived breast cancer is the enduring presence of fatigue after primary treatment has ended. Research has indicated that up to 41% of all breast cancer survivors are fatigued for months to years after treatment completion.¹ Concomitant to the fatigue experienced during survivorship, studies have also found that insomnia, anxiety, and depression are often present and can negatively impact quality of life.^{2,3} Despite the prevalence of fatigue in breast cancer survivors (BCS), limited information exists on whether women can be grouped according to their level of fatigue. This paper will offer new information on fatigue levels in BCS with insomnia and the relationship of fatigue to anxiety, depression, and quality of life.

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BACKGROUND

Fatigue is well documented as a troublesome and significant concern in women receiving treatment for breast cancer.^{4,5} Cancer-related fatigue (CRF) is described as persistent feelings of exhaustion, weariness, malaise, lack of energy and motivation, and an inability to concentrate.⁶ The inability of a person to maintain a prior level of physical functioning may be one of the most distressing characteristics of CRF.⁷

Research findings highlight the continued presence of fatigue post cancer treatment.^{8,9} Fatigue was recently reported as the most severe and frequent symptom experienced in women up to 6 months post surgery for early stage breast cancer.¹⁰ In a longitudinal study of disease-free BCS (n=150) completing treatment at least six months prior, 56% of the women reported a heightened sense of fatigue at baseline including fatigue that was severe and persistent.¹¹ These women also had high levels of anxiety, sleep disturbance, and problems with physical and social functioning. During the study's 2-year follow-up period, women overall reported an 11% decrease in fatigue; yet in half the women, persistent fatigue remained. Fatigue severity was not related to type of treatment or time since treatment had ended.

Correlates of post-treatment fatigue in persons with varying cancer diagnoses were summarized from the empirical findings of 16 research studies.² Results suggest fatigue severity is significantly related to insomnia, state and trait anxiety, depression and quality of life. Findings from a systematic review of 18 studies which followed women 4 months to 10 years after completion of breast cancer treatment, offers further evidence of the continued presence and severity of post-treatment fatigue when compared to a control population.⁸ Physical functioning and mental fatigue were also noted as significantly different between BCS and the participants who served as a control.

It is apparent across survivorship studies which have examined CRF that persistent and severe fatigue is evident in many women following successful breast cancer treatment. What is not known is if BCS can be grouped according to their level of fatigue and if fatigue-based groups do exist, can they be further characterized by insomnia severity, anxiety, depression and quality of life. The primary purpose of this study was to identify subgroups of BCS with insomnia based on their level of fatigue. After identification of fatigue subgroups, a second aim was to then determine if these subgroups differed in insomnia severity, anxiety, depression, quality of life, and demographic and clinical characteristics.

Theoretical Framework

A theoretical framework useful in guiding the current study is the Theory of Unpleasant Symptoms (TUOS).¹² Central to this theory is the assumption that multiple symptoms have underlying commonalities which includes the premise that they often occur together. The experience of multiple symptoms is thought to have a synergistic rather than additive effect on the patient. In patients with cancer, this can be illustrated by findings that indicate that the worst fatigue and sleep quality were related to the most severe pain.¹³ Antecedent patient factors that interact and influence the symptom experience are categorized as physiological (e.g., disease stage, co-morbidities), psychological (e.g., anxiety and depression) and situational (e.g., marital status and employment).¹⁴ Performance is the consequential outcome of the symptom experience which is indicated by an individual's functional and cognitive abilities. Quality of life is conceptualized as one outcome of performance. Relationships among patient factors, symptoms, and performance outcomes are viewed as reciprocal, for example severe fatigue may create increased anxiety, leading to difficulties in problem solving. Individuals are more likely to experience decreases in performance as the number and severity of cancer symptoms increases.

METHODS

Design and Setting

A secondary analysis was performed with data obtained from a randomized clinical trial that examined the efficacy of a cognitive-behavioral intervention for insomnia in BCS.¹⁵ Study participants were breast cancer survivors, 18 years of age or older, with a diagnosis of stage I, II, or III breast disease who were at least 3 months post completion of primary breast cancer treatment and without current evidence of active disease. Inclusion criteria for an insomnia problem were also met including: sleep-onset and/or sleep maintenance insomnia at least 3 nights per week for at least 3 months, as determined through daily sleep diaries. The data used in this analysis was obtained at baseline from 86 women prior to entry into the randomized clinical trial. The flow of participants in the study to baseline is shown in Figure 1. The convenience sample was recruited from physician referral, newspaper advertising, and breast cancer support groups.

Institutional review board approval was obtained from the academic and clinical research sites prior to beginning the study. Women received an explanation of the study and gave written informed consent before participation.

Instruments

Participant demographic and clinical characteristics were obtained from a questionnaire that included information related to age, marital status, ethnicity, education and income level, employment, number of chronic illnesses, cancer stage at diagnosis, months since cancer diagnosis and completion of primary treatment, and type of treatment received.

Fatigue was assessed using the Profile of Mood States Fatigue/Inertia Subscale (POMS F/I). This subscale is a part of the 65-item adjective rating scale of the Profile of Mood States (POMS).¹⁶ The 7-item subscale contains seven adjectives suggesting weariness, inertia and low energy level. Item responses range from 0 (not at all) to 4 (extremely) on a 5-point scale with totaled subscale scores ranging from 0 to 28. Each scale item is a symptom of fatigue. Higher totaled scores indicate a greater level of fatigue. The POMS-F/I demonstrates test-retest reliability, internal consistency, concurrent, and construct validity.¹⁶ At baseline, Cronbach's alpha was .94. The POMS has been used in studies of breast cancer patients.^{17,18}

Insomnia severity was measured by the Insomnia Severity Index (ISI).¹⁹ The 7-item scale evaluates perceived insomnia severity in a Likert-type format with responses ranging from 1 to 5. Totaled scale scores range from 7 to 35. Higher scores indicate greater insomnia severity; a cut-off score of 15 indicates clinically significant insomnia.²⁰ The ISI has established estimates of reliability and validity and is sensitive to changes in insomnia as a result of treatment.²¹ Cronbach's alpha at baseline in this study was .60.

Anxiety was measured by the State-Trait Anxiety Inventory (STAI) which consists of two subscales that assess state (STAI-S) and trait anxiety (STAI-T).²² Each Likert-type scale has 20 items with responses ranging from 1 to 4. The totaled STAI scores range from 40 to 160 with higher scores suggesting greater anxiety. Test-retest correlations indicate adequate stability with evidence of concurrent, convergent, divergent, and construct validity.²² Cronbach's alpha at baseline for the STAI was .92. The scales have been used in prior research with cancer patients; including breast cancer.^{23,24}

Depression was measured by the Center for Epidemiologic Studies-Depression Scale (CES-D). The CES-D is a 20-item scale that assesses for the presence and severity of depressive symptoms.²⁵ Item responses range from 0 to 3 with total scale scores ranging from 0 to 60. Higher scores indicate greater depression with a score of > 16 indicating depression. The CES-

D is used in both clinical and general populations with reliability coefficients above .90 and .85, respectively.²⁶ At baseline, Cronbach's alpha was .86. The CES-D has also been used in cancer populations including women with breast cancer.^{27,28}

Quality of life was measured by the 39-item Functional Assessment of Cancer Therapy-Breast (FACT-B) (Version 4). The FACT-B assesses the multiple dimensions of quality of life in women with breast cancer including physical well-being (FACT-PWB), emotional well-being (FACT-EWB), social well-being (FACT-SWB), functional well-being (FACT-FWB) and relationship with doctor.²⁹ Nine items specific to quality of life in breast cancer are also included. Item responses range from 0 to 4 with totaled scale scores ranging from 0 to 156. Higher scores indicate better quality of life. The FACT-B has demonstrated an alpha coefficient of .90 with convergent, divergent, and known groups validity.³⁰ At baseline, Cronbach's alpha for the FACT-B was .88. The scale has been widely used in BCS.^{31,32}

Data Analysis

Descriptive statistics were used to examine demographic and clinical characteristics and totaled scale scores for the entire sample. To determine whether the fatigue subgroups differed on participant characteristics, one-way ANOVAs were used for interval or ratio data and chi-square tests for nominal data.

Latent class analysis (LCA) was used to summarize a fatigue-based profile of BCS with insomnia. LCA is a latent variable model that served to group women together who are similar to each other based on the fatigue data used in the analysis.

A sequence of four LCA models, from one to four classes were run with the seven items from the POMS-F/I as observed continuous indicators. The Akaike's Information Criterion (AIC) and Bayesian Information Criterion (BIC) were computed to compare the 4 models, and a model was selected based on minimizing either the AIC or BIC.³³ In addition, the quality of the resulting classification was also evaluated in terms of the separation of the latent classes using the entropy index. Entropy denotes how possible it is to predict class membership given the observed indicators. Values range from 0 to 1, and high values (>0.90) indicate that the latent classes are highly discriminative. All models were fit using Mplus software, version 5.³⁴

MANOVAs were conducted for POMS-F/I items and the variables used to characterize the fatigue subgroups (insomnia severity, anxiety, depression, and quality of life scales) to control the experiment-wide error rate. When the MANOVA revealed a significant difference, follow-up one way ANOVAs with Tukey's HSD post-hoc comparisons using SPSS 16 software were performed for the individual variables.

RESULTS

Demographic and clinical characteristics of the 86 women who completed the study questionnaires at baseline are presented in Table 1. The mean age of the participants was 58 years with most being White (94%) and married (69%). The mean education level was 15.8 years (high school =12 years) with an annual household income of \$50,000-60,000. Almost half the women were retired with the number of comorbidities ranging from 0 to 6 (Mean=1.4, SD=1.2). A majority of women (80%) were diagnosed with Stage I or II disease and had received a range of treatments including surgery (i.e., lumpectomy, mastectomy), followed by chemotherapy and/or radiotherapy in some women. Many women (54%) were on hormonal therapy at the time of the study. Mean time since diagnosis was 73 months (range=5 months-31 years) with a mean time since primary treatment ended of 58 months (range= 3 months-31 years).

Table 2 presents the mean scale scores for fatigue, insomnia, anxiety, depression, and quality of life for the total sample (Table 2). Fifty-eight women (68%) were noted to have clinically significant insomnia (ISI score >15). Scores on the CES-D indicated 20 (24%) women had a clinically significant level of depression (score >16). These mean score values are similar to findings that have been reported in other BCS studies.^{28,35,36}

Classification of Participants by POMS Fatigue/Inertia Subscale Items

Based on the lowest Akaike (AIC) value of 1494.05, lowest BIC value of 1566.62 and entropy value of .92, the LCA identified three subgroups according to distinctive patterns obtained from the 7 adjectives comprising the POMS-F/I (Figure 2). Group 1 (n=29, 35%) included women who were high on all seven items of the POMS-F/I suggesting high weariness, inertia, and very low energy. The mean of each item capturing fatigue was above 2.0 and higher than the other two groups. Given the consistent pattern of high levels on each item, Group 1 was labeled “Exhausted” which denotes a high level of fatigue. Group 2 (n=34, 41%) was characterized by average levels on the seven POMS-F/I items with means ranging from .91 to 1.85. Because of this pattern Group 2 was labeled “Tired” which denotes a moderate level of fatigue. Group 3 was the smallest subgroup with 20 participants (24%) and had the lowest values on all seven items, indicating very little weariness, inertia, and good energy levels. Group three was labeled “Restored” as it appeared women in this subgroup had been able to regain back their energy and level of functioning or perhaps they did not experience to begin with the moderate-to-severe fatigue that many BCS report at post-treatment.

The MANOVA for the POMS-F/I items indicated that there were significant differences among the subgroups (Wilks’ Lambda $F_{7,74} = 144.22, p = .0001$). To determine differences on the seven POMS-F/I items among the three subgroups, follow-up one-way ANOVAs with Tukey’s post hoc tests were conducted (Table 3). There was a consistent pattern with the Exhausted group having the high mean on each scale item followed by the Tired group, and then the Restored group. All pairwise comparisons were statistically significant for the POMS-F/I items of ‘worn out’, ‘fatigued’, ‘exhausted’, ‘sluggish’, and ‘bushed’. For the items of ‘listless’ and ‘weary’, the Tired and Restored group were statistically significantly different from the Exhausted group, but not different from each other.

The MANOVA for the variables used to characterize the fatigue subgroups (insomnia severity, anxiety, depression, and quality of life scales) indicated that there were significant differences among the subgroups (Wilks’ Lambda $F_{9,71} = 2374.59, p = .0001$). Follow-up ANOVAs showed several differences. There were significant differences among the subgroups on insomnia severity ($F_{2,80} = 9.23, p = .001$) with the Exhausted group having significantly greater insomnia than the Tired and Restored groups (Table 4). Significant differences were also noted on anxiety, with the Restored and Tired groups having a significantly lower level of state ($F_{2,80} = 9.44, p = .001$) and trait ($F_{2,80} = 12.54, p = .001$) anxiety compared to the Exhausted group. The Exhausted group had a significantly higher level of depression in comparison to the Tired and Restored groups ($F_{2,80} = 10.40, p = .001$).

Overall quality of life revealed significant differences among the subgroups ($F_{2,78} = 13.1, p = .001$) with the Exhausted group reporting poorer quality of life. Significant differences for physical ($F_{2,80} = 13.045, p = .001$), emotional ($F_{2,79} = 4.618, p = .013$), functional ($F_{2,79} = 9.425, p = .001$), and breast cancer quality of life ($F_{2,79} = 5.559, p = .006$) were evident with the Restored and Tired groups indicating better scores on these quality of life subscales than the Exhausted group. For emotional well being, there was a significant difference only between the Tired and Exhausted groups with the Exhausted group having poorer emotional well-being. While the social well being subscale had a significant omnibus F test the pairwise comparisons were not significant after Tukey’s adjustment.

There were no differences among the subgroups (Table 5) on any patient characteristics including age, education, income, marital status ($\chi^2=8.75, p=.55$) and employment ($\chi^2=4.77, p=0.57$). Likewise there were no group differences for stage at diagnosis, number of chronic illnesses, number of months since diagnosed and end of primary treatment, type of treatment ($\chi^2=4.77, p=0.57$), and receiving hormonal therapy ($\chi^2=3.61, p=0.16$).

DISCUSSION

The present study is the first to report on a profile of fatigue-based subgroups in BCS with insomnia. Results revealed an Exhausted subgroup who in comparison to the other groups had the highest level of fatigue on all items with significantly greater insomnia, state and trait anxiety, depression and a poorer quality of life. A second subgroup named Tired scored in a moderate range on all fatigue items and reported an overall lower quality of life when compared to the third subgroup named Restored. The Restored group with the fewest number of BCS scored lowest on fatigue and highest on overall quality of life.

These findings lend support to research which has indicated that many women experience moderate-to-high fatigue (i.e., Exhausted and Tired groups) many years past completion of primary treatment. In contrast is a smaller group of BCS (Restored group) who reported little weariness. It would be interesting to examine the characteristics or attributes that helped these women regain their energy level, or buffered them from experiencing the fatigue reported by many BCS. These findings would offer nursing a greater understanding of personal and cancer-related factors that might place individuals at lower risk for fatigue. Additional insight into the strategies that might better assist women with exhausting fatigue would also be gained.

The significant inclusion of insomnia severity, anxiety and depression into the Exhausted group resulted in a clearer profile of women in this fatigue subgroup. The potentially synergistic effect of the heightened symptoms in these BCS, undoubtedly contributed to the poorer quality of life that was also found. The inclusion of anxiety in studies examining survivorship fatigue is uncommon and yet as this study revealed, anxiety and fatigue were both high in the Exhausted group suggesting a positive association between these two symptoms. The Tired and Restored groups who differed in their level of fatigue did not vary significantly with respect to insomnia severity, anxiety, and depression. This finding would appear to suggest that closer links may exist among these symptoms when being concurrently experienced with a high level of fatigue. These results should be interpreted with caution due to the cross sectional nature of the study which captured symptom severity and symptom relationships at one point in time.

Participant characteristics did not further distinguish the subgroups which was somewhat unexpected. Research has noted in persons with cancer that significant relationships exist among symptom reporting and demographic and clinical characteristics including patient age, marital status, disease stage and type of treatment.^{37,38} It can be reasonably assumed that the strength of these relationships might be influenced by the symptoms that were chosen for examination within the study. For example, some studies have measured pain, fatigue, and insomnia,³⁹ whereas others have focused on pain, fatigue, emotional distress, and treatment side effects.³ The nonsignificant differences found among subgroups in relation to patient characteristics may also be attributed to the homogeneity in sample characteristics.

A question arising from this study that bears further scrutiny is whether anxiety and depression are symptoms that impact outcomes such as quality of life or are they as proposed in the Theory of Unpleasant Symptoms^{12,14} antecedent patient factors that influence the symptom experience? Further examination of these symptoms is warranted in order to provide conceptual clarity as to their placement in theories that would guide our understanding of post-treatment fatigue and quality of life in BCS.

Quality of life was assessed in this study with results demonstrating its importance in distinguishing the subgroups. It would be of value to assess additional patient outcomes such as physical functioning, and to examine the strength of these outcomes in distinguishing among subgroups of women with varying levels of fatigue.

Study findings are limited in their generalizability with the sample comprised of BCS who were predominately white, married, and well-educated. The cross-sectional measurement of symptoms in this analysis did not allow for a determination of whether fatigue changes with time and if so, the influence of this change on membership in the fatigue-based subgroups.

Participant inclusion criteria in the larger randomized clinical trial included the presence of an insomnia problem. This may have affected the results of the analysis and membership in the fatigue subgroups that were subsequently identified. Many women had clinically significant levels of insomnia at baseline, which could impact the reporting of other symptoms (e.g., 25% of the sample had significant depression) and subsequent quality of life.

Implications for Nursing

The grouping or “clustering” of cancer-related symptoms has been highlighted in a recent report⁴⁰ as an important priority for nursing research. As mentioned in this report, greater knowledge is needed regarding the interaction of multiple symptoms and their potential impact on cancer patient outcomes if advances are to be realized in caring for persons diagnosed with cancer. In particular, patterns of symptom association and synergy among symptoms should be explored.

The existence of an Exhausted group in this study (women high on all symptoms with a poorer quality of life) informs nursing to proactively assess for the continued presence of multiple symptoms once treatment has ended, with an understanding that a single, intense symptom rarely occurs in reality. In particular, the focus of care should target those women who upon evaluation relate or are observed to have unrelenting fatigue. Given the growing body of knowledge related to symptoms that commonly occur together, symptom interactions, and their association with quality of life, nursing needs to move beyond the past practice of managing fatigue as an isolated symptom. The greatest positive impact on BCS quality of life may now appear to lie within the treatment of a group of symptoms being concurrently experienced with fatigue (i.e., insomnia, anxiety, and depression).

Preliminary data are encouraging from our larger BCS study upon which this secondary analysis was conducted, that revealed women who received a cognitive- behavioral intervention for insomnia also experienced significant improvements in fatigue, trait anxiety, depression and quality of life.⁴¹ Further testing of this intervention may involve BCS in active treatment to determine if reducing fatigue and its associated symptoms during this phase may decrease the frequency and severity of fatigue experienced during survivorship. The sustaining of positive treatment effects over time starting at time of treatment has not been reported in relation to survivorship fatigue.

The quantification of an underlying biological mechanism that might explain why specific symptoms often coexist with fatigue remains an active area of inquiry. One explanation for why this may occur in patients with cancer is the biological synthesis and activation of cytokines.⁴² A limited number of studies offer encouraging findings that cytokine levels have a positive correlation to fatigue symptoms in persons with cancer, including breast cancer survivors with persistent fatigue.^{43,44} This area of investigation has the strong potential to offer clinical nursing practice an additional method for determining intervention effectiveness, with positive changes in biomarkers indicative of better symptom management and improved quality of life.

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Figure 1.
Participant Flow to Study Baseline

Figure 2.
Three Cluster Solution Based on Participant Responses to POMS-F/I Items

Table 1

Participant Demographic and Clinical Characteristics

Characteristic	Mean (SD)
Age (years) (n=86)	57.8 (10.1)
	<u>Range 29-86</u>
Marital status (n=86)	
Married	59 (69%)
Other	27 (31%)
Education (years) (n=82)	15.8 (2.8)
	<u>Range 9-24</u>
Stage at diagnosis *	
I	44 (51%)
II	24 (28%)
III	10 (12%)
Type of treatment (n=86)	
Lumpectomy only	2 (2.3%)
Mastectomy only	18 (22%)
Lumpectomy/adjuvant therapy	43 (50%)
Mastectomy/adjuvant therapy	22 (25%)
Unknown	1 (1.4%)
Time since diagnosis (months) (n=86)	72.6 (71.7)
	<u>Range 5- 374</u>
Time since primary treatment end (months) (n= 86)	57.9 (68.6)
	<u>Range 3-369</u>

* Disease had not spread for eight participants (9 %), stage was unknown

Table 2

Participant Scores for Total Sample (n=86)

Variable (Instrument)	Mean (SD)	Range
Fatigue (POMS-F/I)	10.7 (7.3)	0-28
Insomnia severity (ISI)	23.3 (4.1)	14-33
Anxiety (STAI)	67.3 (16.7)	41-122
Depression (CES-D)	11.1 (7.3)	1-38
Quality of life (FACT-B)	109.0 (16.7)	61-139

POMS-F/I: The Profile of Mood States-Fatigue Scale; ISI: Insomnia Severity Index; STAI: State-Trait Anxiety Inventory; CES-D: Center for Epidemiologic Studies-Depression Scale; FACT-B: Functional Assessment of Cancer Therapy- Breast

Table 3

Fatigue Subscale Item Means for Total Sample and Each Subgroup

Subscale Item	Total N=86 Mean (SD)	Exhausted N=29 Mean (SD)	Tired N=34 Mean (SD)	Restored N=20 Mean (SD)	p ^a	Results ^b
worn out	1.7 (1.3)	2.9 (0.8)	1.6 (0.8)	0.2 (0.4)	91.18	R<T<E
listless	1.2 (1.1)	2.1 (1.0)	0.9 (0.8)	0.4 (0.5)	28.10	R, T < E
fatigued	1.9 (1.2)	3.0 (0.8)	1.9 (0.6)	0.5 (0.6)	87.68	R<T<E
exhausted	1.6 (1.4)	2.9 (0.9)	1.3 (0.9)	0.1 (0.3)	77.15	R<T<E
sluggish	1.4 (1.1)	2.9 (0.9)	1.2 (0.7)	0.3 (0.5)	60.81	R<T<E
weary	1.6 (1.3)	2.8 (0.9)	1.0 (0.8)	0.5 (0.7)	56.64	R, T < E
bushed	1.4 (1.3)	2.8 (0.8)	0.8 (0.7)	0.05 (0.2)	133.04	R<T<E

^aAll F tests are significant ($p<=.001$)

^bR=Restored, T=Tired, E=Exhausted.

Table 4

Participant Scores on Study Variables for Three Subgroups

Variable (Instrument)	Exhausted (N=29) Mean (SD)	Tired (N=34) Mean (SD)	Restored (N=20) Mean (SD)	F	p value	Results ^b
Insomnia severity (ISI)	18.6 (3.6)	15.7 (3.6)	14.1 (4.2)	9.23	0.00	R, T < E
Anxiety-state (STAI-S)	35.9 (9.2)	29.7 (6.1)	26.5 (7.1)	9.44	0.00	R, T < E
Anxiety-trait (STAI-T)	41.4 (9.3)	36.5 (7.6)	29.5 (7.4)	12.54	0.00	R, T < E
Depression (CES-D)	15.1 (7.7)	10.4 (6.7)	6.5 (4.5)	10.40	0.00	R, T < E
Quality of life (FACT-B Total)	98.5 (16.6)	111.7 (13.7)	119.6 (12.7)	13.13	0.00	R < T < E
Physical well-being (FACT-PWB)	19.9 (5.5)	23.2 (3.4)	25.6 (2.1)	13.05	0.00	R, T > E
Social well-being (FACT-SWB)	20.0 (6.0)	22.6 (5.1)	23.8 (5.1)	3.20	0.05	R, T, E
Emotional well-being (FACT-EWB)	19.3 (3.0)	20.4 (2.8)	21.7 (2.2)	4.62	0.01	T > E
Functional well-being (FACT-FWB)	16.9 (4.1)	20.1 (3.3)	21.4 (3.9)	9.43	0.00	R, T > E
Breast cancer (FACT-Breast)	22.3 (5.0)	25.5 (5.0)	26.8 (4.7)	5.56	0.01	R, T > E

^bR=Restored, T=Tired, E=Exhausted.

Table 5
Participant Scores on Demographic and Clinical Characteristics for Three Subgroups

Characteristic	Exhausted (N=29) Mean (SD)	Tired (N=34) Mean (SD)	Restored (N=20) Mean (SD)	F	p value
Age (years)	57.0 (9.9)	57.0 (9.7)	61.7 (9.7)	1.73	0.18
Education (years)	15.8 (3.0)	15.8 (3.0)	15.8 (2.5)	0.00	1.00
Family income*	4.9 (2.1)	5.1 (1.8)	5.9 (1.5)	1.67	0.20
Stage at diagnosis	1.7 (0.8)	1.5 (0.7)	1.7 (1.0)	0.66	0.52
Number of comorbidities	1.7 (1.5)	1.2 (1.0)	1.4 (1.2)	1.03	0.36
Number of months since diagnosed	72.0 (60.2)	65.6 (64.6)	89.5 (98.8)	0.69	0.51
Number of months since treatment end	63.3 (61.8)	45.2 (54.6)	75.4 (97.0)	1.29	0.28

* Income levels, 1= < \$10,000; 2=\$10,000 – 19,999; 3=\$20,000 – 29,999; 4= \$30,000 – 39,999; 5=\$40,000 – 49,999; 6=\$50,000 – 59,999; 7=\$60,000 – 69,999; 8= > \$70,000