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Evaluation of the psychometric properties of the BCPT Symptom Checklist with a sample of breast cancer patients before and after adjuvant therapy

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Abstract

Objective—The purpose of this analysis was to provide psychometric information related to the Breast Cancer Prevention Trial (BCPT) Symptom Checklist in women with breast cancer prior to the initiation of adjuvant therapy and 6 months post-initiation of therapy.

Methods—This investigation was a secondary analysis of baseline data from the Anastrozole Use in Menopausal Women (AIM) Study (R01 CA 107408). The data used in this study were obtained from women diagnosed with Stage I, II, and IIIa breast cancer and who received adjuvant therapy that included chemotherapy alone, anastrozole alone, and chemotherapy plus anastrozole. Data were examined before adjuvant therapy ($n = 278$), and at 6 months post-adjuvant therapy ($n = 195$). Construct validity was examined through exploratory and confirmatory factor analysis (CFA), and the internal consistency of each resulting subscale was computed. Discriminant validity evidence was obtained by correlating BCPT subscales with subscales from the MOS SF-36.

Results—A seven-factor structure was extracted from the 42 items at baseline; an eight-factor structure was found using 6-month data. CFA was performed to compare the baseline and 6-month models as well as an eight-factor model recommended by Cella *et al.* Findings revealed that the two eight-factor models best represented the data. Low negative correlations with the subscales of the MOS SF-36 provided discriminant validity evidence.

Conclusion—This analysis provides evidence for the reliability, discriminant validity, and factor structure of the BCPT Symptom Checklist. Further testing of this instrument is needed to confirm the factor structure of this measure.

Keywords

BCPT Symptom Checklist; psychometrics; factor analysis; breast cancer; adjuvant therapy

Introduction

Numerous studies have been aimed at trying to better understand the effect of breast cancer and its treatment on various aspects of women's lives. Much of this work has focused on the short- and long-term impact of adjuvant chemotherapy on symptoms, quality of life, and functional ability [1–3]. Symptoms related to hormone therapy for breast cancer differ from those commonly associated with chemotherapy and include menopausal symptoms such as hot flashes, night sweats, and vaginal discharge [4–7].

Tamoxifen is one of the most widely prescribed hormonal agents for the prophylaxis and treatment of breast cancer [6]. Tamoxifen is a selective estrogen receptor modulator (SERM) that acts by competitively inhibiting the binding of estrogen with estrogen receptors [8]. Newer generation hormonal agents such as the aromatase inhibitors, inhibit aromatase (enzyme essential for the conversion of androgens to estradiol) ultimately impeding estrogen biosynthesis. Significantly lower estrogen levels are observed in women who receive aromatase inhibitors compared with women who receive SERMs such as Tamoxifen [9]. As a consequence, women who receive aromatase inhibitors may experience different or more profound symptoms compared with women who receive tamoxifen therapy.

Few instruments are available to specifically evaluate the unique symptoms experienced by women receiving hormonal therapy for breast cancer [3,6,7,10]. Documentation of these symptoms is crucial to clinical practice and research.

The Breast Cancer Prevention Trial (BCPT) Symptom Checklist was adapted by the National Surgical Adjuvant Breast and Bowel Project (NSABP) investigators to assess the presence and severity of symptoms related to tamoxifen as part of the BCPT—1991 [7,11]. This instrument has demonstrated reliability and validity as a measure of symptoms in women who had previously been diagnosed with breast cancer or were at risk for the disease [10]. The psychometric properties of this instrument have not been established in women with breast cancer currently receiving therapy nor have these properties been examined in a group of women with breast cancer before they initiate adjuvant therapy and at a follow-up time point after the initiation of therapy. The purpose of this analysis was to provide psychometric information related to the BCPT Symptom Checklist in women with breast cancer prior to the initiation of adjuvant therapy and 6 months post-initiation of therapy.

Breast cancer prevention trial (BCPT) Symptom Checklist

The BCPT Symptom Checklist is a 42-item self-report measure that was adapted from a Symptom Checklist developed for the National Heart Lung and Blood Institute (NHLBI) Post-menopausal Estrogen/Progestin Intervention (PEPI) trial. Symptoms assessed with the BCPT Checklist include hot flashes, weight problems, vaginal problems, cognitive problems, and bladder control issues. Women indicate the presence or absence of symptoms and, if present, specify the extent to which they are bothered by those symptoms on a five-point Likert scale ranging from 0 (Not at all) to 4 (Extremely). Women also have the opportunity to indicate the presence and severity of any additional problems they are experiencing on an open response item (item 43) [10].

Construct validity of the BCPT has been established using factor analytic techniques. An initial exploratory factor analysis of the 42-item scale revealed seven factors: hot flashes, nausea, bladder control, vaginal problems, musculoskeletal pain, cognitive problems, and weight problems. These seven factors had factor loadings of greater than 0.60. Two items were added *a priori* to the original 42-item BCPT to assess 'arm swelling' and 'decreased range of motion', which formed an eighth factor. The total variance explained by the eight factors was approximately 61% [10].

Cella and colleagues [11] conducted exploratory factor analysis using the 42-item BCPT in 4000 women at high risk for breast cancer 12 months after they commenced tamoxifen or placebo. Confirmatory factor analysis (CFA) was performed on the baseline (pre-tamoxifen or placebo) BCPT responses of this same group of women. Eight clusters of symptoms were revealed and confirmed including, cognitive symptoms, musculoskeletal pain, vasomotor symptoms, nausea, sexual problems, bladder problems, body image, and vaginal symptoms. They also performed a content analysis of women's open-ended responses to item 43 suggesting four potential additional symptoms including fatigue, back problems, abdominal pain, and leg/foot cramps [11].

Stanton *et al.* [10] examined discriminant validity of the BCPT Symptom Checklist in healthy women using the physical and mental component of the Medical Outcomes Study Short Form-36 (SF-36). Findings indicated that BCPT Symptom Checklist scales were modestly negatively correlated with the SF-36 scales with most correlation coefficients (r) less than 0.30, suggesting that the two scales are independent of one another. Cella *et al.* found moderate correlations (≥ 0.30) between the BCPT cognitive and musculoskeletal pain symptom clusters they identified and both SF-36 subscales and the Center for Epidemiological Studies—Depression Scale [11].

While the psychometric properties of the BCPT have been established in women who had previously been diagnosed with breast cancer or were at high risk for the disease, there have been no reports of these properties using the full 42-item measure in women with breast cancer before they initiate adjuvant therapy and at a follow-up time point after the initiation of therapy.

Method

This investigation was a secondary analysis of baseline and follow-up data from the Anastrozole Use in Menopausal Women (AIM) Study (R01 CA 107408). The primary objective of the AIM study was to examine the effects of the aromatase inhibitor, anastrozole, on cognitive function in women with early stage breast cancer completed after surgery and prior to the initiation of treatment and at 6 months after the initiation of adjuvant therapy. In this study, the data collected with the BCPT Symptom Checklist were used to find evidence of construct validity of the instrument through factor analysis. The data used in this study were obtained from women diagnosed with Stage I, II, and IIIa breast cancer and who received adjuvant therapy that included chemotherapy alone ($n = 27$), anastrozole alone ($n = 157$), or chemotherapy plus anastrozole ($n = 94$).

Measures

This study used the data collected from subjects who completed the 42-item BCPT Symptom Checklist and the Medical Outcomes Study Short Form-36 (MOS SF-36) [11] at baseline, prior to the initiation of adjuvant therapy ($n = 278$), and 6 months following the initiation of adjuvant therapy ($n = 195$) to examine the psychometric properties of the instrument. Item 43 was included on the BCPT Symptom Checklist, which asked subjects to list other symptoms. The two items related to arm swelling and decreased range of motion that were added to the measure by Stanton *et al.* [10] were not included in the BCPT administration as these symptoms are assessed with another measure in the AIM study battery.

The MOS SF-36 is a 36-item self-report measure of quality of life, organized into eight dimensions: physical functioning, role limitations caused by physical health problems, bodily pain, general health perceptions, vitality, social functioning, role limitations caused by emotional problems, and general mental health [12]. Scores on the subscales are

standardized, ranging from 0 to 100, with higher scores indicating better quality of life. RAND 36-Item Health Survey procedures were used to calculate the summary scores for physical and psychological functioning. Internal consistency of the MOS SF-36 subscales ranged from 0.62 to 0.96. Test-retest reliability ranged from 0.60 to 0.81 [13].

Statistical analysis

Descriptive statistics were used at baseline ($n = 278$). The distributions of the forty-two quantitative items were examined and a formal test using Mahalanobis distance was performed to identify possible influential outliers. No influential outliers were detected. A total score on the 42-item BCPT was calculated by summing across all items. Item total correlations were examined to determine that all items were properly coded. Additionally, the item correlation matrix was assessed to summarize the interrelationships among the items and to identify possible item clusters.

In order to establish the appropriateness of conducting a factor analysis at both baseline and at 6 months, the Kaiser-Meyer-Olkin (KMO) statistic was computed. The KMO statistics at baseline (0.79) and at 6 months (0.82) exceeded the minimum recommendation of 0.6 [14], which indicated that a factor analysis could be performed at both time points.

Principal Axis Factoring (PAF) with *Varimax* rotation was then performed on both the baseline and 6-month data for the four groups of the AIM Study. PAF considers the correlation matrix, which seeks the fewest number of factors that can account for variance in the set of variables [15]. Varimax rotation, which assumes uncorrelated factors, was chosen for this analysis in order to provide a simplified factor matrix for clear interpretation [16]. An eight-factor structure was imposed on the data based on the findings of Cella *et al.* [11]. To ascertain which items loaded on the eight factors, factor loadings, scree plots, and the amount of variance extracted were examined. Factors were formed by selecting items with high loadings, defined as item loadings that were three times higher on a specific factor than on any other. The conceptual basis of the instrument and the findings of Cella *et al.* [11] were also considered when selecting items to form factors. Exploratory factor analysis was performed using SPSS version 17 [17].

CFA was implemented using the factor structures extracted at both the baseline and 6-month time points for the purpose of determining which model best represented the data. Subjects with data at both baseline and 6 months were included in the CFA ($n = 195$). The baseline structure was fit to both baseline and 6-month data and the 6-month structure was imposed on both the baseline and 6-month data. Additionally, both baseline and 6-month data were used in an analysis of the eight-factor structure suggested by Cella *et al.* [11]. The CFA models were estimated using SAS PROC CALIS [18] with the covariance matrix from the sample data, with items constrained to load on one factor. In order to determine which model best fit the data (baseline, 6-month or Cella *et al.* [11] model), the following fit indices were examined: Root Mean Square Error of Approximation (RMSEA); Comparative Fit Index (CFI); the Normed Fit Index (NFI); and the Non-normed Fit Index (NNFI). RMSEA values of 0.05 or less and values greater than or equal to 0.90 for CFI, NFI, and NNFI were considered indicators of good model fit [19].

Once the appropriate factor structure was identified by determining the best model, the internal consistency of each scale was computed using Cronbach's alpha [20]. Next, a baseline and 6-month total score were computed by summing the items that made up the eight scales. Wilcoxon Signed Rank tests were performed to test change over time on total score (using the 21-item scale) and on each of the eight subscales for all three groups; the Bonferroni correction was applied for interpretation of the 27 hypotheses, with a p -value of less than 0.002 indicating significance. Correlations between the eight factors and the

physical and psychological component scores of the MOS SF-36 were computed to inspect discriminant validity.

The responses for the open-ended item were then examined to determine if subjects were frequently reporting other symptoms that did not appear on the 42-item checklist. Symptoms were listed as reported by the subjects and were then sorted into one of three groups: (1) comorbid condition (not a symptom); (2) symptom already represented in 42-item BCPT; or (3) unique symptom not represented in 42-item BCPT. Frequencies of the unique symptoms were then inspected at baseline and 6 months.

Results

A total of 278 post-menopausal women completed the BCPT at baseline. The baseline assessment occurred before the initiation of adjuvant therapy in women with early stage breast cancer and at a comparable time in healthy controls. One hundred ninety-five of the women had completed the BCPT at the follow-up assessment that occurred 6 months after baseline. Descriptive statistics of the demographic characteristics of the three adjuvant therapy groups are provided in Table 1. Women were on an average 60.5 years of age and had completed an average 14.7 years of education. Most were currently married (62.9%) and were white (95.3%). Item total correlations were positive for all items at both time points, indicating consistent coding. Item correlation matrices revealed potential item clusters with conceptual meaning.

Table 2 lists the items that formed the eight factors of the Cella *et al.* [11] study, and contains rotated matrix factor loadings from the exploratory factor analysis from this study. The EFA revealed that an eight-factor structure best described 21 items of the baseline data. Bolded items represent the baseline structure. Factor one, cognitive symptoms, explained most of the variance (20.1%); all eight factors explained 50.06% of the variance. Communalities (i.e. the amount of item variance explained by the eight factors) ranged from 0.10 to 0.72.

The data at 6 months post-initiation of treatment was characterized by a seven-factor structure. Twenty-one items constitute the seven factors. Table 2 includes the items and rotated factor matrix loadings for each factor. Again, factor one, which was the cognitive symptoms factor, attributed most to the total variance explained (22.78), while all seven factors explained 52.55% of the total variance. Three of the factor compositions changed from baseline, including: the cognitive symptoms factor, which increased from three items to four items; the gastrointestinal symptoms factor, which increased from two to three items; and the gynecologic symptoms factor, which was not represented in the 6-month data. Communalities ranged from 0.15 to 0.77.

Several models were tested using CFA, including the eight-factor baseline structure, the seven-factor 6-month structure, and the 21-item, eight-factor structure reported by Cella *et al.* [11]. Findings revealed that the eight-factor solution of the EFA and the structure of Cella *et al.* [11] were superior to the seven-factor structure at both baseline and 6 months. Both eight-factor solutions yielded fit indices indicative of a good model fit. Table 3 reports the model fit statistics for all models at baseline and 6 months. The eight-factor structure that was formed in the EFA of this study was probed for further reliability and validity evidence.

Table 4 includes the coefficient alphas for each of the eight factors at baseline and 6 months. The internal consistencies for both time points varied, with a range from 0.259 to 0.923. The cognitive problems factor produced the highest measure of internal consistency for both

baseline and 6-month data, while the gynecological symptoms factor yielded the lowest internal consistency for each time point.

The total score for the 21-item eight-factor structure based on the EFA of this study was examined for change over time. Results of the Wilcoxon Signed Rank test indicated that the mean rank total score changed significantly between baseline and 6 months for the chemotherapy plus anastrozole group ($z = -4.69$, $p < 0.001$), the chemotherapy only group ($z = -3.63$, $p < 0.001$), and for the anastrozole only group ($z = -4.17$, $p < 0.001$). Further exploration revealed that for the chemotherapy plus anastrozole group, the mean rank score for the musculoskeletal pain factor was significantly different from baseline to 6 months ($z = -5.24$, $p < 0.001$), while findings for the anastrozole alone group indicated evidence of significant change for the musculoskeletal pain ($z = -4.17$, $p < 0.001$), vasomotor symptoms ($z = -4.58$, $p < 0.001$), and dyspareunia ($z = -3.46$, $p = 0.001$) factors. These results provide evidence that subjects in all three treatment groups experienced more severe symptoms at 6 months in comparison with baseline. In particular, subjects in the chemotherapy plus anastrozole group and the anastrozole alone group experienced more severe musculoskeletal pain after treatment.

Low negative correlations between the subscales of the BCPT and the MOS SF-36 provide evidence of discriminant validity for the eight-factor solution of this study (see Table 5). The strongest negative correlation was between the musculoskeletal pain scale of the BCPT and the physical functioning scale of the MOS SF-36 at baseline ($r = -0.401$); this association suggests that as patients experience more musculoskeletal pain, physical functioning declines. The cognitive symptoms scale of the BCPT and the psychological functioning scale of the MOS SF-36 were weakly correlated at baseline ($r = -0.344$) and 6 months ($r = -0.308$).

Two symptoms that were unrepresented by the 42-item checklist were uncovered through examination of the open-ended response item. These two new items were classified as anxiety/tension and sleep problems. Ten percent of chemotherapy plus anastrozole group reported feelings of anxiety and tension at baseline, while only 2% reported these feelings at 6 months. Five percent of the chemotherapy plus anastrozole group indicated that they were experiencing sleep problems at baseline, and this dropped to 4% at 6 months. At baseline, 1.9% of the subjects in the anastrozole alone group reported sleep problems, but that number jumped to 5% at 6 months. Subjects in the chemotherapy alone group reported these two symptoms at a rate of less than 2% at both time points.

Discussion

The findings presented here provide support for the use of the BCPT as a measure of symptoms in women with breast cancer before and after the initiation of adjuvant therapy. The exploratory factor analysis revealed eight factors at baseline including, cognitive symptoms, musculoskeletal pain, vasomotor symptoms, gastrointestinal symptoms, dyspareunia, bladder control, weight concerns, and gynecologic symptoms. These eight factors were best described by 21 items of the BCPT at the baseline assessment. Seven factors were revealed at the follow-up; all baseline factors were represented with the exception of the gynecologic symptoms factor. Twenty-one of the BCPT items best described the seven factors present at the follow-up assessment. At both the baseline and follow-up assessment, cognitive symptoms explained the greatest amount of the variance.

CFA revealed that the eight-factor structure found at baseline and the eight-factor structure reported by Cella *et al.* [11] were superior to the seven-factor structure at both time points. It should be noted that the items that formed the eight factors of this study were different from

the items that formed Cella's [11] factors; specifically, different items formed the musculoskeletal pain (2 additional), gastrointestinal (one less item), weight concerns factors (2 different items), and gynecologic symptoms (one less item) factors of this study. The basis for the differences in the items that formed the eight-factor structure in this study and those of Cella *et al.* [11] may be the differences in the samples between the two studies. While the sample for this study was composed of post-menopausal women with early stage breast cancer. The sample in Cella *et al.* [11] was composed of healthy women at high risk for breast cancer who ranged in age from 35 to 79; thus, the sample was composed of both pre- and post-menopausal women. Despite the differences in the 21-item factor structures between the two studies, both models produced fit indices that indicated 'good' properties.

Stanton *et al.* [10] reported an 18-item, eight-factor structure which did not include a gynecologic symptom factor but did include a factor for arm problems. The basis for the divergent findings between this study and the Stanton study may, in part, lie in the differences in the samples and the time points for administration of the BCPT between the two studies. There is less variability in the age of women in this study and women are older (59.8 years) than the four samples in Stanton *et al.* (47–57 years) [10]. Although not specified, due to the range of the mean ages across the four samples in Stanton's investigation, presumably, the samples were composed of both pre- and post-menopausal women, whereas, the sample for the AIM study is composed exclusively of post-menopausal women.

The findings of this study as well as those reported by Stanton *et al.* [10] and Cella *et al.* [11] suggest that a shorter version of the BCPT may be appropriate for the assessment of symptoms in women with and without breast cancer who receive hormonal therapy. The exploratory factor analysis conducted by Stanton *et al.* suggested an 18-item version of the BCPT. Bower *et al.* used a 15-item version of the BCPT to measure treatment-related symptoms in women with breast cancer [2,3,5–7,10]. However, the 15 items were selected *a priori*, based on a desire to assess vasomotor symptoms, whereas the 21 items found in this study were identified through factor analytic approaches. Clearly, additional work is needed to substantiate the use of a shorter version of the BCPT and to delineate the items that would comprise that shorter version.

There is a great deal of overlap between the items that form the factor structure across this study and those of Cella *et al.* and Stanton *et al.* however there are some differences [10,11]. A possible explanation for the differences in factor structures across these studies could be 'inapplicable items'. Waller [21] suggested that self-report scales can sometimes include items that are not relevant for some individuals in certain contexts. Including even a small number of inapplicable item responses can radically change the interpretability of a scale [21]. This implies that if the characteristics of the sample change, certain symptoms that are assessed by the BCPT can become irrelevant, thus influencing differences in the factor structure.

Discriminant validity of the seven-factor structure was evidenced through low to moderate negative correlations with the MOS SF-36 physical and psychological component subscales. These findings are similar to those of Stanton *et al.* [10] and Cella *et al.* [11] who also found low to moderate negative correlations between the BCPT factors and the MOS SF-36 physical and mental component summary scores. Only three scale correlations between the BCPT and SF-36 exceeded $r = 0.30$, the BCPT cognitive symptoms factor with the SF-36 psychological component scale ($r = 0.344$ at baseline and $r = -0.308$ at follow-up) and the BCPT musculoskeletal pain factor with the SF-36 physical component scale ($r = -0.401$ at baseline). These findings are not surprising given the evidence of these relationships in patients with cancer. Cognitive complaints are related to depression and anxiety in patients

with cancer [22]. Moreover, musculoskeletal pain is one of the most prominent symptoms associated with anastrozole therapy and may predict nonadherence to anastrozole therapy [23]. Therefore, it is not surprising to find that higher scores on items in this factor are correlated with a lower score on the MOS SF-36 physical component summary score indicating poorer physical functioning.

A Wilcoxon Signed rank test revealed total scores on the 21 items that formed the eight factors of the EFA were significantly different over time for all three groups. The baseline and follow-up assessments in this study occurred before and 6 months after the initiation of adjuvant therapy. The BCPT had been administered between 7 and 71 months after the diagnosis of breast cancer in the Stanton investigation [10] and there was more variability in the time of assessment. This variability may have accounted for the differences in internal consistency and the factors.

Moreover, the symptoms experienced by women just after learning of a breast cancer diagnosis but before the initiation of systemic adjuvant therapy are likely to be different from those experienced by women years after that diagnosis. In an examination of the open-ended item responses of the AIM study, it was found that women were more likely to experience feelings of anxiety and tension before treatment, while sleep disturbances occurred before and after therapy. These responses differ from the open-ended responses provided by the participants in Cella *et al.* [11] which included fatigue, back problems, abdominal pain, and leg/foot cramps. Again, the basis for the differences in open-ended responses between the two studies may lie in differences between the study samples.

Similarly, the follow-up assessment in this study occurred 6 months after baseline. Nearly 50% of the women in this study had just completed chemotherapy, a factor that also likely contributed to the differential symptom experience compared with women in Stanton *et al.* and Cella *et al.* [10,11]. The symptoms experienced by these women may be more a reflection of the long-term consequences of breast cancer treatment.

Conclusion

Growing numbers of women with breast cancer are treated with hormonal therapy. Five years of hormonal therapy are generally prescribed for women hormone receptor positive breast cancer. As women are living longer with this disease, there is a need to accurately assess the symptoms that women with breast cancer experience as the basis for development of interventions to manage these symptoms.

This analysis provides evidence for the reliability, discriminant validity, and factor structure of one measure of the unique symptoms associated with hormonal therapy in breast cancer, the BCPT Symptom Checklist. Further testing of this instrument is needed to confirm the factor structure of this measure and to demonstrate the sensitivity of the measure to change in symptom frequency and severity in women with breast cancer. The BCPT appears to be a good measure of symptoms associated with hormonal therapy in women at high risk for breast cancer as well as women with a breast cancer diagnosis. Future investigations should focus on identifying a comprehensive set of items that best capture the symptoms experienced by these different populations of women taking hormonal therapy.

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Table 1**Demographics**

	ChemoAnast	ChemoOnly	AnastOnly	Total Sample
<i>Age (in years)</i>				
Mean (SD)	59.0 (5.35)	58.9 (7.02)	61.6 (6.50)	60.5 (6.32)
Min	44	49	45	44
Max	68	73	75	75
<i>Education (in years)</i>				
Mean (SD)	14.7 (2.98)	14.6 (2.37)	14.8 (2.98)	14.7 (2.92)
Min	6	12	4	4
Max	22	18	26	26
<i>Marital status</i>				
<i>Frequency (percentage)</i>				
Never married	12 (13.8)	1 (3.7)	12 (7.6)	25 (9.0)
Currently married	56 (59.6)	19 (70.4)	100 (63.7)	175 (62.9)
Living with partner	2 (2.1)	2 (7.4)	n/a	4 (1.4)
Widowed	8 (8.5)	2 (7.4)	18 (11.5)	28 (10.1)
Separated	3 (3.4)	n/a	4 (2.9)	7 (2.5)
Divorced	13 (13.8)	3 (11.1)	23 (14.6)	39 (14.0)
<i>Ethnicity</i>				
<i>Frequency (percentage)</i>				
White	89 (94.7)	22 (81.5)	154 (98.1)	265 (95.3)
African American	5 (5.3)	5 (18.5)	3 (1.9)	13 (4.7)

Table 2

Factor loadings of EFA for baseline and 6 months

	Baseline	6 Months
1. <i>Cognitive symptoms</i>		
* Forgetfulness	0.618	0.713
* Difficulty concentrating	0.744	0.848
* Easily distracted	0.761	0.805
Avoidance of social affairs	**	0.581
2. <i>Musculoskeletal pain</i>		
* General aches and pains	0.677	0.781
* Joint pains	0.646	0.762
* Muscle stiffness	0.543	0.663
Swelling of hands or feet	0.448	0.367
Numbness or tingling	0.492	0.480
3. <i>Vasomotor symptoms</i>		
* Hot flashes	0.798	0.771
* Night sweats	0.809	0.866
* Cold sweats	0.435	0.504
4. <i>Gastrointestinal symptoms</i>		
* Nausea	0.502	0.692
* Vomiting	0.301	0.706
*Diarrhea	**	0.415
5. <i>Dyspareunia</i>		
* Vaginal dryness	0.635	0.894
* Pain with intercourse	0.666	0.664
6. <i>Bladder control</i>		
** Difficulty with bladder (laughing or crying)	0.762	0.865
* Difficulty with bladder (other times)	0.723	0.767
7. <i>Weight concerns</i>		
Weight loss	0.553	0.566
Decreased appetite	0.795	0.679
*Weight gain	**	**
*Unhappy with the appearance of my body	**	**
8. <i>Gynecologic symptoms</i>		
* Vaginal discharge	0.661	**
Genital itching/irritation	0.558	**
*Vaginal bleeding or spotting	**	**

* Item contained in Cella *et al.* (2008) eight-factor structure.

**
Factor loading did not meet 3× higher criterion.

Table 3

Confirmatory factor analysis fit statistics at baseline and 6 months

Chi Square	RMSEA	CFI	NFI	NNFI
<i>Eight-factor structure</i>				
Baseline $\chi^2=335.5$, $df=161$, $p<0.001$	0.06	0.90	0.82	0.86
6 Months $\chi^2=286.1$, $df=161$, $p<0.001$	0.05	0.94	0.86	0.91
<i>Seven-factor structure</i>				
Baseline $\chi^2=382.8$, $df=168$, $p<0.001$	0.07	0.88	0.80	0.84
6 Months $\chi^2=283.1$, $df=168$, $p<0.001$	0.06	0.93	0.85	0.91
<i>Cella et al.</i>				
<i>Eight-factor structure</i>				
Baseline $\chi^2=293.0$, $df=161$, $p<0.001$	0.06	0.92	0.82	0.89
6 Months $\chi^2=229.3$, $df=161$, $p=0.0003$	0.05	0.94	0.87	0.92

Table 4

Coefficient alphas for the eight subscales at baseline and 6 months

	Baseline	6 Months
Cognitive symptoms	0.871	0.923
Musculoskeletal pain	0.723	0.802
Vasomotor symptoms	0.770	0.804
Gastrointestinal symptoms	0.624	0.690
Dyspareunia	0.618	0.772
Bladder control	0.804	0.819
Weight problems	0.616	0.701
Gynecological symptoms	0.557	0.259

Table 5

Correlations between BCPT factors and the MOS SF-36

	Baseline		6 Months	
	SF-36 physical component scale	SF-36 psychological component scale	SF-36 physical component scale	SF-36 psychological component scale
Cognitive symptoms	−0.186	−0.344	−0.154	−0.308
Musculoskeletal pain	−0.401	−0.174	−0.272	−0.145
Vasomotor symptoms	−0.050	−0.171	−0.007	−0.138
Gastrointestinal symptoms	−0.261	−0.183	−0.141	−0.129
Dyspareunia	0.016	−0.093	0.034	−0.068
Bladder control	−0.187	−0.055	−0.233	−0.064
Weight problems	−0.250	−0.164	−0.146	−0.079
Gynecological symptoms	−0.032	−0.092	−0.089	−0.167
^a Total	−0.329	−0.279	−0.200	−0.214

^aTotal score at both baseline and 6 months was computed using the 21 items that comprised the eight-factor structure.