Review Article

Open to Exploration? Association of Personality Factors With Complementary Therapy Use After Breast Cancer Treatment

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Abstract

Purpose: Many cancer survivors seek complementary therapies (CTs) to improve their quality of life. While it is well-known that women who are younger, more highly educated, and have higher incomes are more likely to use CTs, individual differences such as personality factors have been largely unexplored as predictors of CT use. **Methods:** In a secondary analysis of a larger study, 270 women with stage I to III breast cancer completed self-report measures of demographic and illness-related information, personality variables, and use of several different types of CTs. A series of logistic regression models were used to explore whether demographic, illness-related, and personality variables predicted different types of CT use. **Results:** Prior relationships between education and CT use were replicated. There were no significant relationships between illness-related variables and different types of CT use. Of the 5 personality factors, only openness to experience was a significant predictor of multiple types of CT use. **Conclusions:** Openness to experience may represent an individual difference variable that predicts CT use among cancer survivors. CTs themselves may represent a form of intellectual curiosity and novelty seeking. Further studies are needed to replicate and examine the generalizability of the relationship between openness to experience and CT use in oncology populations.

Keywords

complementary therapies, personality, cancer survivor, openness to experience, integrative oncology

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Introduction

Cancer survivors use complementary and alternative medicine (CAM) significantly more often, and spend significantly more money on it, than individuals without cancer.[1] CAM refers to health care systems, practices, and products that are generally not part of conventional medicine.[2] It broadly describes several categories of practices, including alternative medical systems (eg, homeopathy), mind-body therapies, natural health products and supplements, manipulative body-based therapies, and energy therapies. While CAM encompasses both complementary therapies (CTs, which are practiced in conjunction with conventional medicine) and alternative therapies (practiced in lieu of conventional medicine), the terms are typically used interchangeably and true practice of alternative medicine is uncommon.[2] Hence, while the term CAM has historically been used in the literature, we used the term CTs in our research to imply the use of these therapies in conjunction with conventional care rather than as an alternative, and use it throughout this article instead of CAM.

A meta-analysis published in 2012 estimated that 40% of cancer survivors worldwide use CTs, though estimates are slightly higher in North American countries (46%) and slightly lower in European countries (34%).[3] Several recent

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studies published since then have found similarly high rates of CT use[4-8] or higher.[1,9-12] Cancer survivors have reported several reasons for CT use, including alleviating side effects of treatment, improving health/healing/immune function, wanting control, and improving emotional/psychological functioning.[13-15] However, decision making regarding CT use is dynamic and tends to change throughout the trajectory of the illness.[16] Despite the high prevalence of CT use, up to 77% of users do not discuss their CT use with their health care practitioners.[7,17] Rather, family and friends are listed as the most common sources of information about CT use.[7,15] This is problematic as some unconventional therapies may be ineffective or even harmful, and some may interfere with the effectiveness of conventional medications.[18]

Many studies have aimed to delineate the factors associated with CT use among cancer survivors, for several reasons. For example, it is useful for health care practitioners to know which individuals are more likely to use CTs, particularly if rates of disclosure of CT use to practitioners are low. Furthermore, understanding who may be more willing to use CTs may aid practitioners in making recommendations, potentially improving adherence to therapeutic recommendations,[19] and enhancing quality of care.[20] Studies have consistently demonstrated that women, those with breast cancer diagnoses, those with higher education, those with higher incomes, and those who are younger are more likely to use CTs.[13,15,21] There is some evidence that CT users tend to have greater symptom severity,[22] including depressive and anxious symptoms,[21] but evidence regarding the relationship between disease severity and CT use is mixed. While some studies have found higher rates of CT use related to more severe disease[5,23] and more time since diagnosis,[6] other studies have found higher rates of CT use among those with less severe disease progression[4,20] or no relationship.[11]

While most studies that characterize CT users include demographic and illness-related variables, relatively few studies have attempted to characterize CT users in terms of psychological and individual difference variables such as personality characteristics. A study by Lo-Fo-Wong and colleagues examined CT use in 176 women with breast cancer in the Netherlands and included a measure of the personality factor "openness to experience."[24] The authors found a relationship between openness to experience and CT use and posited that those who are more open may be more willing to experiment with CT, perhaps due to "holistic or proactive health motivations." However, they did not assess the influence of any other personality factors. Another study by Olchowska-Kotala examined willingness to use CTs in 49 patients (36 female) in Poland that were heterogeneous in terms of cancer type and progression, and included a measure of "The Big 5" personality factors (openness to experience, conscientiousness, extraversion, agreeableness, and neuroticism).[25] Olchowska-Kotala found that greater extraversion, greater neuroticism, and lower openness to experience were related to CT use. While the inverse relationship between openness to experience and CT use was unexpected, the author speculated that healthy patients may be more willing to experiment with CTs while cancer patients might be more pragmatic about treatment options. While Lo-Fo-Wong et al examined whether openness was related to both provider-directed and self-directed CTs, neither of these studies examined the association between personality factors and specific types of CTs (eg, alternative medical systems, mind-body therapies, energy therapies).

In sum, there is scarce, conflicting literature on personality factors and CT use among cancer survivors and a lack of specificity of CT types investigated to date. The present study reports exploratory analyses examining associations between personality factors and use of different types of CTs in a sample of distressed, posttreatment breast cancer survivors. Illness-related variables were also examined in light of the inconsistent findings reported in the literature. Demographic variables were included to replicate prior research.

Methods

Participants

The present study is based on secondary analysis of baseline data from individuals participating in a randomized controlled trial examining Mindfulness-Based Cancer Recovery and Supportive-Expressive Therapy (the MINDSET study; NCT00390169).[26,27] The study was approved by the University of British Columbia and British Columbia Cancer Agency REB (#H0603309), and the Conjoint Health REB of the University of Calgary (#E-20444). Inclusion criteria were (*a*) women who had been diagnosed with stage I to III breast cancer, (*b*) had completed treatment at least 3 months previously, (*c*) and were experiencing emotional distress, indicated by a score ≥4 on the Distress Thermometer.[28]

Materials

Participants provided demographic and illness-related information, including age, education, cancer stage, and months since cancer diagnosis. Information regarding CT use and personality was also collected through self-report questionnaires. While education is presented as a categorical variable in Table 1, a separate continuous variable that measured years of education was used for analyses.

Complementary Therapy Use. Individuals were asked whether they used several different types of CTs in the past month, and whether they used supplements 4 or more times

Table 1. Demographic and Illness-Related Characteristics.

Characteristics	
Age, y, *M* (SD)	54.68 (10.19)
Months since diagnosis, *M* (SD)	26 (27.77)
Cancer stage,[a] % (n)	
0	2.7 (7)
I	39.6 (107)
II	35.9 (97)
III	13.3 (36)
IV	1.1 (3)
Highest education completed, % (n)	
Less than high school	3.4 (9)
High school	29.9 (80)
College/university/technical school	56.7 (152)
Graduate degree	10.0 (27)
Marital status, % (n)	
Single	16.2 (42)
Married/cohabiting	63.7 (165)
Separated/divorced	16.6 (43)
Widowed	3.5 (9)

[a]While a self-reported diagnosis of stage I to III breast cancer was part of inclusion criteria, 3 individuals had a diagnosis of stage IV breast cancer when diagnoses were later confirmed by chart review. It is unclear whether these individuals misreported their stage or whether their cancer became metastatic.

per week in the past month. Types of CTs were categorized afterward into mind-body therapies (ie, meditation, relaxation techniques, yoga), manipulative body-based therapies (ie, chiropractic, reflexology, massage), alternative medical systems (ie, homeopathy, naturopathy), energy therapies (ie, acupuncture, spiritual healing), and supplements (eg, vitamin A, fish oil, green tea). For each of the 5 CT types, use was dichotomized such that 0 represented no use and 1 represented any use of one or more therapies of that type in the past month.

Personality. The 60-item NEO Five Factor Inventory (NEO-FFI)[29] was used as a measure of personality. Based on the Five Factor Model of personality, it assesses dimensions openness to experience, conscientiousness, extraversion, agreeableness, and neuroticism. Internal consistency in this data set was high for the NEO subscales neuroticism (α = .85), extraversion (α = .81), openness (α = .71), and conscientiousness (α = .82); but lower for agreeableness (α = .62). Raw NEO-FFI scores were used in analyses.

Analyses

A series of exploratory logistic regression models was used to examine whether the demographic, illness-related, and personality variables predicted each type of CT use. The demographic/illness-related variables age, education, cancer stage, and months since diagnosis were entered together into models (see Table 3) to curb type I error and examine the independent contribution of each predictor. For the same reasons, the personality factors neuroticism, extraversion, openness, agreeableness, and conscientiousness were entered together into models (see Table 4).

Results

Of the 277 women who participated in the MINDSET study, 270 women provided information about their CT use and represent the sample in the present study. On average, women were 55 years old; had completed college, university, or technical school (57%); were married or cohabiting (64%); had been diagnosed with stage I (40%) or II (36%) breast cancer; and were 26 months after diagnosis at the time of the survey. Illness-related variables were later confirmed by chart examination. Little's MCAR (missing completely at random) test showed data were missing at random (P = .92). The strength of association between predictor variables was r = -.44 or lower, thus multicollinearity was not an issue. Table 1 outlines the demographic and illness-related characteristics. Most (94%) women had used at least one type of CT in the past month. The most commonly used CT was supplements (88%), followed by manipulative body-based therapies (32%), mind-body therapies (27%), energy therapies (11%), and alternative medical systems (8%). See Table 2 for specific prevalence of use of each specific therapy examined in the questionnaire. Raw NEO-FFI scores for neuroticism (M = 34.54, SD = 8.13), extraversion (M = 39.18, SD = 6.94), openness (M = 41.57, SD = 5.9), agreeableness (M = 44.96, SD = 4.77), and conscientiousness (M = 45.54, SD = 6.64) were used.

Table 3 presents the demographic and illness-related predictors of different types of CTs. Among the demographic variables, higher education was a small but significant predictor of manipulative body-based therapy (odds ratio [OR] = 1.14, confidence interval [CI] =1.04-1.26, P < .01), mind-body therapy (OR = 1.11, CI = 1.01-1.22, P = .03), and energy therapy use (OR = 1.15, CI = 1.01-1.32, P = .04). Age was only significantly related to supplement use, such that older age predicted supplement use (OR = 1.06, CI = 1.01-1.12, P = .02). Of the illness-related variables, there were no significant relationships between cancer stage or months since diagnosis and use of any of the CT types.

Table 4 outlines the relationships between the 5 personality factors and 5 CT types. Among the personality factors, openness to experience was the only significant predictor of any CT type, such that greater openness to experience predicted use of manipulative body-based therapies (OR = 1.08, CI = 1.03-1.13, P < .01), energy therapies (OR = 1.08, CI = 1.01-1.16, P = .03), and alternative medical systems (OR = 1.17, CI = 1.07-1.28, P < .001). Consistent with this

Table 2. Use of Complementary Therapies in the Past Month.

Complementary Therapies	% (n) Who Used
Any supplement use[a]	88.1 (237)
Vitamin D	67.3 (181)
Calcium	60.2 (162)
Multivitamin	46.8 (126)
Vitamin C	27.5 (74)
Fish oil	22.7 (61)
Green tea	19.0 (51)
Vitamin B_{12}	16.7 (45)
Vitamin B_6	13.4 (36)
Vitamin E	11.5 (31)
Vitamin A	10.4 (28)
Coenzyme Q10	10.0 (27)
Glucosamine	9.7 (26)
Garlic	6.7 (18)
Folic acid	5.6 (15)
Selenium	5.6 (15)
Zinc	4.8 (13)
Ginger	3.0 (8)
β-Carotene	2.6 (7)
Peppermint	1.5 (4)
Echinacea	1.1 (3)
Essiac	0.7 (2)
Ginkgo biloba	0.7 (2)
Ginseng	0.4 (1)
Shark cartilage	0 (0)
St. John's Wort	0 (0)
Any manipulative body-based therapy use	31.5 (85)
Massage therapy	25.2 (68)
Chiropractic	8.9 (24)
Reflexology	2.6 (7)
Any mind-body therapy use	27.4 (74)
Yoga	14.4 (39)
Relaxation	12.2 (33)
Meditation	11.5 (31)
Any energy therapy use	11.1 (30)
Acupuncture	7.8 (21)
Spiritual healing	4.4 (12)
Any alternative medical system use	7.8 (21)
Naturopathy	6.3 (17)
Homeopathy	2.6 (7)

[a]Supplement use was measured as *use 4 or more times per week* in the past month.

pattern, openness to experience was also a near-significant predictor of mind-body therapy use (OR = 1.05, CI = 1.00-1.10, $P = .05$).

Discussion

The present study examined use of 5 different types of CTs among breast cancer survivors and relationships with demographic, illness-related, and personality variables. The prevalence of CT use in the present study (94%) was much higher than the prevalence reported in the 2012 meta-analysis, though similar to prevalence rates reported in recent studies from the United States.[10-12] This could be related to self-selection of study participants who enrolled in a study that included mind-body therapies. Furthermore, the demographic characteristics of the present sample—female sex and breast cancer diagnoses—are both linked to higher rates of CT use.[9,13,15] The meta-analysis by Horneber et al[3] in 2012 described higher prevalence rates of CTs in studies where individuals were presented a list of options to choose from and when no types of CTs were excluded. Thus, the present study's use of a predetermined list of CT types, including several types of supplements, may also have contributed to the high prevalence rate. Finally, the inclusion criteria of emotional distress in the present study may have contributed to the high prevalence of CT use, as those who are more distressed may be more driven to seek alternative treatment methods for symptom relief. The most commonly used CT in the present study was supplements, which is consistent with several other studies.[14,15]

Higher education was a significant predictor of several types of CT use in the present study, consistent with several prior studies.[13-15] Given that education contributes to socioeconomic status, it could be that individuals with higher education have more means to access CTs, particularly as they can be expensive and are often paid out of pocket.[1] Additionally, those with higher education may be more knowledgeable about the availability of CTs.[13] Although the relationship between younger age and CT use has been well established, in the present study older age was unexpectedly related to supplement use, and no other CT types were significantly related to age. The relationship between older age and supplement use might be explained by the broad inclusion of supplement types, some of which individuals may have used for reasons unrelated to cancer symptom management. For example, the most commonly used supplements were calcium (used by 60%) and vitamin D (used by 67%), which are also recommended for promotion of bone health among older adult women.[30]

The lack of any significant relationships between age and any other type of CT use in the present study might have been due to insufficient range of ages to detect differences, as the women in the present study on average appear to be somewhat younger than women in other studies that have reported an association between younger age and CT use.[23,31,32] Similarly, as the inclusion criteria for the present study specified cancer stages I to III, there may have been insufficient range in cancer stage to detect any significant relationship between illness stage and CT use. The prior studies that reported relationships between CT use and disease progression included participants with more advanced tumors or late-stage illness.[4,5,20,23]

Table 3. Demographic and Illness-Related Predictors of Complementary Therapy (CT) Use.[a]

CT Type	Predictor	Odds Ratio	95% Confidence Interval		*P*
			Lower Limit	Upper Limit	
Supplements	Age	**1.06**	1.01	1.12	**.02***
	Education	1.15	0.99	1.34	.07†
	Cancer stage	1.31	0.87	1.96	.20
	Months since diagnosis	0.99	0.98	1.00	.16
Manipulative body-based therapies	Age	0.98	0.95	1.01	.22
	Education	**1.14**	1.04	1.26	**<.01****
	Cancer stage	0.95	0.75	1.20	.64
	Months since diagnosis	1.00	0.98	1.01	.58
Mind-body therapies	Age	0.99	0.97	1.02	.66
	Education	**1.11**	1.01	1.22	**.03***
	Cancer stage	1.00	0.79	1.27	.98
	Months since diagnosis	1.00	0.99	1.01	.69
Energy therapies	Age	0.96	0.91	1.00	.07†
	Education	**1.15**	1.01	1.32	**.04***
	Cancer stage	0.65	0.42	1.01	.06†
	Months since diagnosis	1.01	1.00	1.02	.24
Alternative medical systems	Age	0.98	0.93	1.04	.51
	Education	1.00	0.85	1.18	.99
	Cancer stage	0.60	0.34	1.05	.08†
	Months since diagnosis	1.00	0.99	1.02	.79

[a]Significant relationships are in boldface.
†$P < .10$, *$P < .05$, **$P < .01$.

The present study found greater openness to experience related to use of multiple CTs, namely manipulative body-based therapies, alternative medical systems, and energy therapies. This is consistent with the findings of Lo-Fo-Wong et al,[24] who also studied women diagnosed with breast cancer. The present findings contradict those of Olchowska-Kotala,[25] who reported willingness to use CTs use to be associated with extraversion and neuroticism. However, this study was small; heterogeneous in terms of sex, cancer type, and cancer stage; and did not examine actual CT use. Extraversion or neuroticism in relation to CT use may merit further investigation, as any conclusion would be premature. Openness to experience has been found to relate to CT use in prior studies of noncancer-specific samples.[19,33] This could be because these individuals are more curious and enjoy experimenting, thus may be more likely to try different therapies as part of a holistic and proactive approach.[33] Intuitively, openness to experience makes sense as a predictor of CT use, as this personality factor is characterized by intellectual curiosity, variety seeking, and holding of unconventional values.[34] By definition CTs are unconventional and therefore their use may represent a form of intellectual curiosity and novelty seeking.

On average, the women in the present study scored higher on openness ($M = 41.57$, SD = 5.9) than the NEO-FFI normative sample of nonclinical adult women ($M = 30.18$, SD = 6.09).[35] Another study examining personality traits in women with breast cancer also reported openness scores ($M = 35.55$, SD = 5.83)[36] higher than the NEO-FFI norms, but lower than in the present study. Thus, while breast cancer survivors may be more open to experience than nonclinical adult women in general, the women in the present study were particularly more open to new experiences. This could reflect the nature of the study, which required willingness to participate in either Mindfulness-Based Cancer Recovery or Supportive Expressive Therapy.

The present study adds to a sparse literature concerning personality variables and CT use in cancer survivors. The main strength of the present study is the large sample, homogeneous in terms of sex, cancer type, cancer stage, distress, and completion of active treatment. The main limitation is that the nature of the study required willingness to be randomized to a mind-body therapy, which may already be associated with more openness to experience than average. This is likely reflected in the relatively higher openness scores that were observed in the present study. Thus, it is not clear at present whether results would be generalizable to other groups of cancer survivors who would have more diversity in the trait openness to experience. Furthermore, the measurement of supplement use may have been too broad in the present study, and may be inflated to reflect reasons for use beyond those related to coping with cancer or treatment side effects. Future studies

Table 4. Personality Predictors of Complementary Therapy (CT) Use.[a]

CT Type	Predictor	Odds Ratio	95% Confidence Interval		*P*
			Lower Limit	Upper Limit	
Supplements	Neuroticism	1.01	0.96	1.07	.62
	Extraversion	0.98	0.92	1.05	.60
	Openness	0.99	0.93	1.06	.85
	Agreeableness	1.00	0.91	1.08	.91
	Conscientiousness	0.99	0.93	1.05	.74
Manipulative body-based therapies	Neuroticism	1.04	1.00	1.08	.09†
	Extraversion	1.04	1.00	1.09	.06†
	Openness	**1.08**	1.03	1.13	**<.01****
	Agreeableness	0.96	0.90	1.02	.21
	Conscientiousness	1.00	0.96	1.05	.91
Mind-body therapies	Neuroticism	1.01	0.97	1.05	.80
	Extraversion	0.99	0.95	1.04	.75
	Openness	1.05	1.00	1.10	.05†
	Agreeableness	0.97	0.91	1.03	.29
	Conscientiousness	0.98	0.94	1.02	.34
Energy therapies	Neuroticism	1.03	0.98	1.09	.25
	Extraversion	1.00	0.94	1.06	.99
	Openness	**1.08**	1.01	1.16	**.03***
	Agreeableness	1.04	0.95	1.14	.42
	Conscientiousness	1.03	0.97	1.10	.32
Alternative medical systems	Neuroticism	1.06	0.99	1.13	.12
	Extraversion	0.98	0.91	1.06	.66
	Openness	**1.17**	1.07	1.28	**<.001****
	Agreeableness	1.02	0.91	1.14	.73
	Conscientiousness	1.04	0.96	1.12	.33

[a]Significant relationships are in boldface.
†$P < .10$, *$P < .05$, **$P < .01$.

should consider individual difference variables, particularly openness to experience, as predictors of CT use among cancer patients. Replication of these findings is needed in samples with different cancer types, samples with a broader range of openness scores, and studies that are not related to participation in any other type of CT before generalizability can be established. Additionally, hypotheses that are determined a priori and sample sizes that are appropriately powered are needed, as the present study was exploratory. Better characterizing which cancer survivors are most likely to use CTs or are most receptive to using CTs beyond broad demographic factors can help inform provision of cancer care.

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