Acculturation and Adherence to Physical Activity Recommendations among Chinese American and Non-Hispanic White Breast Cancer Survivors

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Abstract

BACKGROUND—Chinese American breast cancer survivors' adherence to recommended physical activity (PA) guidelines has been understudied. This study investigated their PA adherence by acculturation level (vs. non-Hispanic White (NHW) survivors).

METHODS—195 Chinese and 202 NHW breast cancer survivors (stage 0-III) responded to a cross-sectional survey including a self-reported PA questionnaire. PA adherence referred to meeting PA recommendations for cancer survivors. Acculturation among Chinese was defined by proxies of U.S. residency, English proficiency, and interview language. Logistic regression was performed to examine factors associated with PA adherence.

RESULTS—More-acculturated Chinese survivors' PA adherence rate was 76%. Less-acculturated Chinese survivors' adherence rate (60%) was significantly lower than that of NHWs (80%) (OR = 0.38, 95% CI = 0.19, 0.75). Less-acculturated Chinese survivors were also less likely to engage in vigorous-intensity PA than NHWs. (p<.01).

DISCUSSION—Future research on less-acculturated Chinese survivors' motivation for PA to promote their adherence is needed.

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Keywords

Acculturation; Breast cancer survivors; Chinese American; Physical activity

INTRODUCTION

More than 3.5 million women are breast cancer survivors (1). Research shows that meeting physical activity (PA) recommendations improves physical functioning, reduces fatigue, and decreases anxiety and depression after breast cancer diagnosis (2–7). Increasing PA also decreases the likelihood of breast cancer recurrence and alleviates treatment-induced side effects (5,8–12). The American Cancer Society (ACS) recommends that adult cancer survivors engage in at least 150 minutes of moderate-intensity activities or 75 minutes of vigorous-intensity activities per week, or an equivalent combination moderate- and vigorous-intensity activities (13). Researchers have studied multiethnic breast cancer survivors' adherence to PA recommendations (14, 15). Yet, very few of these studies include Asian immigrant cancer survivors. Paxton et al. (2012) reported that the PA levels of English-speaking Asian American breast cancer survivors were not different from White survivors (15). However, some research showed that more language acculturation among immigrants and longer residency in the mainstream society were related to greater engagement in PA (16, 17). Currently, most research on acculturation and PA focused on Hispanic immigrants and/or non-clinical samples (16). While a few studies reported that low-acculturated or Asian American immigrants (non-cancer populations) had lower participation in PA than other ethnic/racial groups (18–20), these studies often aggregated the data of multiple Asian subgroups whose cultural and social statuses are vastly different. Thus, it is important to segment and study Asian subgroups individually. Notably, none of these studies examined acculturation and the percentage of Chinese American immigrant cancer survivors meeting PA recommendations.

Chinese Americans make up the largest Asian American ethnic group and the fastest growing immigrant group in the U.S. (21), with over 76% of Chinese Americans being first-generation immigrants (22). Approximately 93% of Chinese American women with breast cancer survive for at least five years (23). The number of Chinese American breast cancer survivors will increase considerably not only because the Chinese American population is fast growing but also because their breast cancer incidence rates are steadily increasing by 1-2% every year (24, 25). However, research has shown that foreign-born Chinese breast cancer patients have lower survival than their U.S.-born Chinese counterparts (26, 27), suggesting that acculturation may play a role. Therefore, this study examined whether Chinese American breast cancer survivors' acculturation affected their adherence to the ACS's PA recommendations (versus non-Hispanic White (NHW) survivors after controlling for covariates.

METHODS

This study was part of a large cross-sectional mixed-method research project, guided by an adapted transactional model of stress-coping (TMSC) (28, 29) that examined similarities and

differences in breast cancer survivorship between Chinese American and NHW survivors. The adapted TMSC added sociocultural factors (e.g., acculturation) to investigate how different cultural norms and immigration status affect survivors' behavioral differences in their adaptation to cancer. The Institutional Review Boards at Georgetown University Medical Center, the California Health and Human Services Agency, and the Cancer Prevention Institute of California approved this study.

Participants

Participants (N = 397: 121 less-acculturated, 74 more-acculturated Chinese, and 202 NHW) were identified and recruited from the Greater Bay Area Cancer Registry and Los Angeles Cancer Surveillance Program from August 2011 to September 2013. Eligible participants (1) were at least aged 21 years, (2) diagnosed with stage 0-III breast cancer between May 2006 to January 2012; and (3) had completed primary cancer treatment 1-5 years earlier without recurrence and other cancer.

Data Collection

First, invitation letters were sent to potentially eligible participants. Two weeks after mailing, research staff conducted follow-up phone calls to solicit women's interests in participation and screen for eligibility. Eligible women provided verbal informed consent and received a copy of the consent in the mail prior to participating in an hour-long phone interview. The English survey was translated to standard Chinese, and then back-translated and tested through one-on-one in-depth interviews to evaluate its face validity. Of Chinese participants, about 70% were interviewed in either Mandarin or Cantonese and 30% were interviewed in English. Participants received a $25 gift card for their participation.

Measures

Physical activity (outcome variable)—The International Physical Activity Questionnaire Short Form (IPAQ-SF) was used to measure participants' engagement in walking, moderate, and vigorous physical activities (30). Participants reported how many days in the past week they performed each type of PA for a duration at least 10 minutes as well as the total time (minutes and/or hours) they spent in these types of PA daily. The IPAQ-SF has demonstrated acceptable validity and reliability in numerous populations including Chinese populations (31). Of the 7 items on the IPAQ-SF, we only used 6 items and excluded the sitting item (i.e., time spent in sitting) because it was not included in the IPAQ-SF scoring methods (32). Following the scoring criteria, we estimated minutes of PA per week by each PA type and then multiplied each PA type by the estimated metabolic equivalent (MET): 3.3 METs for walking regardless of its intensity, 4.0 METs for moderate PA, and 8.0 METs for vigorous PA (32). Since some types of walking could be considered as moderate PA, we defined adherence to PA recommendations as having 600 MET-minutes of PA per week, equivalent to the ACS PA recommendations (at least 150 minutes per week of moderate-to-vigorous intensity activity) (13).

Acculturation—Chinese American survivors' acculturation level was defined by three common proxy measures of acculturation: English proficiency, years of U.S. residency, and interview language (33–35). These proxies, especially English proficiency, explain the

majority of variance in acculturation measured by Likert-type scales (36–38) and have been widely used in acculturation studies (39–42). To reduce participants' burden on answering the lengthy survey, we used the Anderson et al. (2003) short English acculturation survey to assess Chinese immigrants' English proficiency in listening, speaking, reading, and writing in 5 levels: 1 = not at all, 2 = a little, 3 = good, 4 = very good, and 5 = excellent (36). The Cronbach's alpha of this survey was 0.97 in Chinese American populations (43). More-acculturated Chinese survivors either were interviewed in English or had good English proficiency (each proficiency score 4) and lived in the U.S. 25 years (median). Remaining Chinese immigrant participants were categorized as less-acculturated. The 25-year median split is consistent with prior research investigating acculturation and health behaviors (41, 42). A report also shows that it usually takes over 20 years for immigrants to be behaviorally acculturated to U.S society (44). Using the combination of these proxies, we have successfully investigated the influence of acculturation on Chinese Americans' attitudes toward cancer screening (43), preference for culturally tailored interventions (45), and socioeconomic stress after cancer diagnosis (28).

Covariates

Demographic/clinical variables—The demographic variables included self-reported marital status, age, race/ethnicity, education, annual household income, health insurance, and employment status. Clinical data included cancer stage, diagnosis date, and first course treatment type, all of which were provided by the cancer registries.

Body mass index (BMI)—Participants' self-reported height and weight were used to calculate BMI. For Chinese Americans, we used the World Health Organization's (WHO) BMI classifications (46) for Asians: < 18.5 kg/m^2 (underweight), 18.5–22.9 kg/m^2 (normal weight), 23.0–27.5 kg/m^2 (overweight), and > 27.5 kg/m^2 (obese). For NHWs, we used the conventional BMI classification criteria (47): < 18.5 kg/m^2 (underweight), 18.5–24.9 kg/m^2 (normal weight), 25.0–29.9 kg/m^2 (overweight), and 30.0 kg/m^2 (obese). Researchers have used the two different BMI cut-points to examine the occurrence of chronic diseases among Asians and NHWs (48, 49).

Comorbidity—We used Charlson et al. (1987)'s weighted index of comorbidity (50) to assess whether or not participants had a comorbidity (e.g., diabetes or hypotension; yes/no). Based on the distribution of participants' responses, comorbidity scores were categorized into three levels: 0, 1, and 2+ comorbidities.

Treatment-related symptoms—Patient-reported symptoms from breast cancer treatment (including hormone therapy) within the previous 12 months were assessed by 34 items (e.g., pain, menopausal symptoms, fatigue), which were adapted from the Memorial Symptom Assessment Scale (51) and symptom measurement of the breast cancer prevention trial (BCPT) (52). Each item was scored 0 = no symptom or 1= had symptom. We summed the number of patient-reported symptoms and divided them into 2 groups by study cohort median: 1) having less than 5 symptoms, and 2) having 5 or more symptoms.

Data Analysis

Data were analyzed in three steps. First, we performed descriptive analyses to examine demographics, clinical variables, and PA adherence for all participants by race/ethnicity and acculturation. Next, we examined bivariate associations between demographic/clinical variables and PA adherence. Finally, we performed logistic regression to examine the association between acculturation and PA adherence, when controlling for covariates (including significant bivariate associations). Sensitivity analyses were conducted to examine whether the regression results differed when separately assessing each of the aforementioned three acculturation proxies. NHW survivors were treated as a comparison (reference) group. Household income was excluded from the multivariable model due to ~8% of these values missing in the data as well as its high correlation with education and insurance types. Odds ratios (OR) and corresponding 95% confidence intervals (CI) were reported. All analyses were conducted using SAS 9.4 version.

RESULTS

Sample characteristics

NHW and more-acculturated Chinese American survivors were more likely to have at least a college education, private insurance, higher annual household income, and fewer comorbidities and treatment-related symptoms than less-acculturated Chinese American survivors (all p <0.05; see Table 1). Less-acculturated Chinese survivors were more likely to be underweight, whereas NHW survivors were more likely to be obese (p <0.01). Notably, more Chinese American survivors, regardless of acculturation level, had stage III breast cancer, whereas more NHWs had stage 0 breast cancer (p <0.001). There were no group differences in the receipt of different types of treatment.

Proportion of breast cancer survivors meeting PA recommendations

Overall, more than 73% of study participants adhered to the recommended PA guidelines: 80% of NHW survivors met the PA recommendations, followed by more- acculturated Chinese (76%) and less-acculturated Chinese American survivors (60%), p <.001. Among the three groups, less-acculturated Chinese were the least likely to report engaging in vigorous activities compared to more-acculturated Chinese and NHWs (p <0.001). However, proportions of survivors engaging in moderate-intensity activity and walking were similar among the three groups (see Figure 1).

Association of acculturation and adherence to PA recommendations

Results from the logistic regression (Table 2) showed that less-acculturated Chinese survivors were 62% less likely to meet the PA recommendations compared to NHW survivors (OR= 0.38, 95% CI: 0.19, 0.75, p <0.05) after controlling for covariates. However, no significant difference was found between more-acculturated Chinese Americans and NHWs in meeting the PA guidelines (OR = 0.69, 95% CI: 0.35 to 1.36, p = 0.28). Among the covariates, BMI and comorbidity were independently and significantly associated with PA adherence. Specifically, survivors who were overweight or obese were less likely to meet the PA recommendations than normal weight survivors (OR = 0.55, 95% CI: 0.32, 0.95 and

OR = 0.25, 95% CI: 0.12, 0.53, respectively, both p<0.05). Finally, survivors who had 2 or more comorbidities were less likely to meet the PA recommendations than survivors with 1 comorbidity (OR= 0.47, 95% CI: 0.25, 0.86, p<0.05). Of note, there was no significant difference in PA adherence between underweight and normal survivors or between survivors without comorbidity and with one comorbid condition. Results from sensitivity analyses showed similar findings. Chinese American survivors who had low English proficiency (OR = 0.49, 95% CI: 0.25, 0.97, p<0.05) or were interviewed in Chinese languages (OR = 0.33, 95% CI: 0.18, 0.62, p<.001) had lower adherence rates than NHWs, whereas there was no significant difference in the rate between Chinese with good English proficiency and NHWs. When only using the years of U.S. residency, both Chinese immigrant groups who had U.S. residency <25 years (OR = 0.53, 95% CI: 0.26, 1.09, p =0.09) or US residency ⩾ 25 years (OR = 0.42, 95% CI: 0.22, 0.80, p<0.01) had lower adherence rates than NHWs. The result that Chinese immigrants who had over 25 years of U.S. residency did not show similar PA adherence rates to NHWs may be because ~60% of these Chinese still had limited English proficiency which may impact their ability to access English language health materials. This suggests that our current approach of considering both English proficiency and length of residency is more comprehensive measure of acculturation for capturing the multi-dimensional pathways by which acculturation may impact PA adherence. Note that there was no difference in PA adherence rates between US-born Chinese and NHWs survivors.

DISCUSSION

To our knowledge, this is one of the few studies investigating PA adherence among a large sample of Chinese immigrant breast cancer survivors in the U.S., with the ability to disentangle patterns by ethnicity and acculturation. We found that less-acculturated Chinese American survivors were less likely than NHW survivors to meet the PA recommendations, whereas more-acculturated Chinese American survivors engaged in PA at a statistically similar rate to their NHW counterparts.

Our finding that nearly two-thirds of the sample met the PA recommendations (~73%) is consistent with a prior study that measured PA including household activity (14). However, our finding is inconsistent with several other research findings that observed only 32-53% of American breast cancer survivors meeting PA recommendations (15, 53). The inconsistency may have a couple of explanations. The first possible explanation is the timing of data collection. Compared to prior studies on PA in breast cancer survivors that collected and published data at least 5 years ago (cases diagnosed between 1976 and 2006) (14, 15, 53), our data were relatively more recent (cases diagnosed between 2006 and 2012). Therefore, the current increasing attention on the benefits of PA to ease treatment-related symptoms and reduce cancer recurrence risk (4) might have resulted in higher adherence rates of PA among our participants. Second, our PA adherence rate might have been overestimated as 3.3 METs was used for walking, regardless of its level of intensity, and 8.0 METs for vigorous activity, a value higher than other studies using 6.0 METs (15, 54). Particularly, since the IPAQ-SF includes all forms of walking (e.g., walking at home or transportation-related walk) and over 88% of our survivors reported walking as their most frequent PA modality, the 3.3 METs assigned to walking might have heightened the adherence rates. Future research with a more specific inquiry about the intensity of walking may verify this possibility.

Our results show that less acculturation is associated with lower adherence to PA recommendations even after adjusting for BMI, education, and clinical variables. There are some possible explanations. First, many of less-acculturated Chinese Americans in our sample were low income. Compared to higher income individuals, lower income individuals are more likely to live in densely populated neighborhoods, characterized by fewer parks and recreational facilities and greater crime rates (55–57). Living in this unfavorable environment may have prevented low-income Chinese American breast cancer survivors from engaging in PA. Second, less-acculturated Chinese survivors in our study were more likely to report physical problems (e.g., comorbidities and treatment-related symptoms) than their counterparts, thus preventing them from engaging in vigorous PA and decreasing the likelihood of meeting PA recommendations. Third, Chinese cultural beliefs may have play a role in affecting PA adherence. A prior study showed that Asian immigrants believe that time outside of work should be used for helping family and household tasks rather than on leisure activities (58). Relatedly, Asian and Chinese culture is oriented by filial piety and preserving family harmony, under which women as primary caregivers usually place family wellness above their wellbeing (59). As such, less-acculturated Chinese survivors may have perceived family duties as a higher priority compared to engaging in PA. Finally, language barriers may have limited less-acculturated Chinese survivors' ability to understand information regarding recommended levels of PA. Indeed, research has shown that language acculturation (using English language) has a positive relationship with adherence of PA among Latinos (60). However, little is known about how neighborhood, cultural beliefs, family support, and access to PA information interact together to explain less-acculturated Chinese American survivors' low adherence to the PA guidelines; thus requiring further investigations.

Scarce research has examined Asian cancer survivors' obesity and PA adherence. Notably, 42% of the less-acculturated Chinese American survivors were observed to be either overweight or obese, a rate similar to their NHW counterparts (43%). Our findings revealed that overweight or obese cancer survivors were less likely to meet the PA recommendations regardless of their race/ethnicity. Notably, obesity is associated with poorer breast cancer survival (61, 62). Thus, less-acculturated, obese Chinese American cancer survivors who do not meet the PA recommendations may be at higher risk for poor survival, suggesting that additional attention is needed to promote this particular group's PA engagement.

The present study has some limitations worth noting. First, we used a validated, self-reported PA questionnaire instead of objective measure (such as accelerometers) to measure physical activity (63, 64). Future research may use accelerometers or physiological responses, such as heart rate monitoring to confirm our findings. Second, more-acculturated Chinese American sample was small and was combined with U.S.-born Chinese survivors (n = 26) in the analysis. This may have biased the examination of acculturation and PA adherence against the NHW group. Thus, cautious interpretation of our study's findings is advised. Lastly, the cross- sectional design precludes our ability to determine causal relationship.

NEW CONTRIBUTION TO THE LITERATURE

Findings of this study add to the growing body of literature on PA among immigrant breast cancer survivors. These findings provide healthcare providers with information on demographic and clinical factors that may affect breast cancer survivors' PA adherence. For example, providers could tailor their recommendations for PA according to Chinese American survivors' acculturation level based on their immigration status and spoken English ability. Recognizing the tendency for less-acculturated Chinese survivors to engage in PA, providers may encourage more walking and/or moderate intensity PA to meet the recommended guidelines. Furthermore, it will be essential to identify or develop culturally and socioeconomically acceptable PA interventions for less-acculturated Chinese survivors, because it will not only help providers with resources for clinical recommendations but also promote the overall PA adherence among this growing yet understudied survivor population.

Acknowledgments

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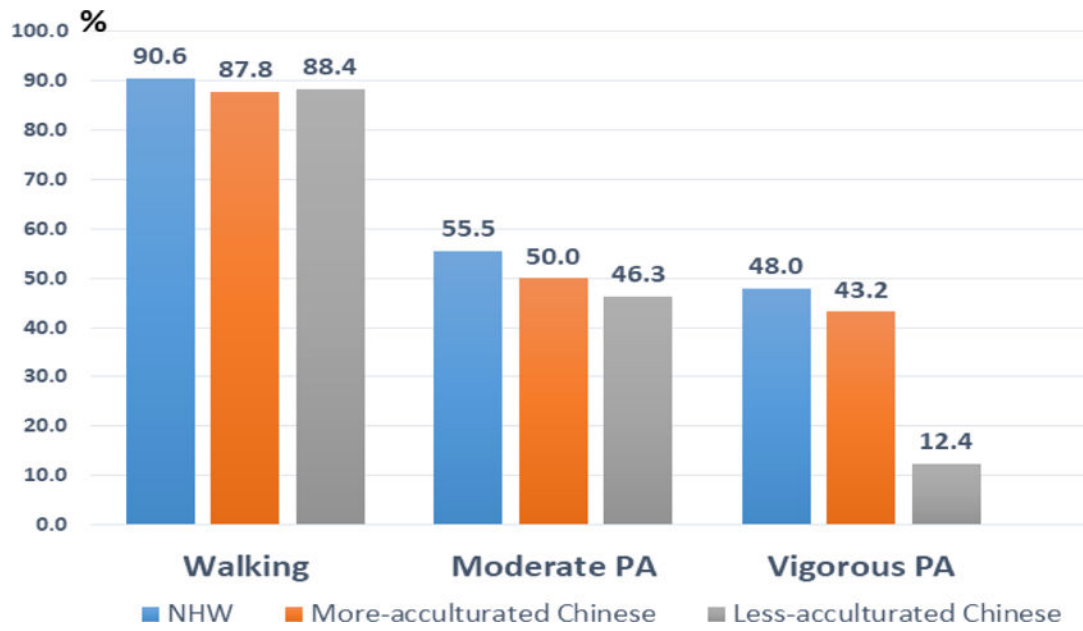
Figure 1.
Percentages of Walking, Moderate, and Vigorous Activities by Group

Table 1

Sample Characteristics of NHW and Chinese American Breast Cancer Survivors

Characteristics		NHW (n=202)	More acculturated Chinese (n=74)	Less acculturated Chinese (n=121)	P-value	Overall N=397
Age category, n(%)	18-50 years old	52(25.74)	24(32.43)	35(28.93)	0.47	111(27.96)
	51-64 years old	98(48.51)	38(51.35)	55(45.45)		191(48.11)
	65 or older	52(25.74)	12(16.22)	31(25.62)		95(23.93)
Education, n(%)	High school	14(6.93)	4(5.41)	58(47.93)	<0.0001	76(19.14)
	College	188(93.07)	70(94.59)	63(52.07)		321(80.86)
Married, n(%)		135(67.16)	47(63.51)	91(75.83)	0.14	273(69.11)
Employed, n(%)		119(59.20)	51(68.92)	54(44.63)	<0.01	224(56.57)
Health insurance, n(%)	Private insurance	191(94.55)	71(95.95)	67(55.83)	<0.0001	329(83.08)
	Government plans	11(5.45)	3(4.05)	53(44.17)		67(16.92)
Annual income, n(%) ¥	30k or lower	10(5.10)	3(4.48)	55(52.88)	<0.0001	68(18.53)
	30,001-99,999	76(38.78)	29(43.28)	28(26.92)		133(36.24)
	100k or higher	110(56.12)	35(52.24)	21(20.19)		166(45.23)
BMI, n(%) †	Underweight	4(1.98)	0(0.00)	14(11.57)	<0.001	18(4.53)
	Normal weight	111(54.95)	39(52.70)	56(46.28)		206(51.89)
	Overweight	57(28.22)	28(37.84)	40(33.06)		125(31.49)
	Obese	30(14.85)	7(9.46)	11(9.09)		48(12.09)
Cancer stage, n(%)	Stage 0	72(35.64)	15(20.27)	27(22.31)	0.0001	114(28.72)
	Stage I	91(45.05)	31(41.89)	55(45.45)		177(44.58)
	Stage II	27(13.37)	14(18.92)	12(9.92)		53(13.35)
	stage III	12(5.94)	14(18.92)	27(22.31)		53(13.35)
Time from diagnosis, n(%)	<24 months	56(27.72)	28(37.84)	35(28.93)	0.34	119(29.97)
	24-36 months	63(31.19)	25(33.78)	37(30.58)		125(31.49)
	>36 months	83(41.09)	21(28.38)	49(40.50)		153(38.54)
Comorbidity limits, n(%)	None	58(28.71)	29(39.19)	22(18.18)	<0.001	109(27.46)
	1 condition	68(33.66)	24(32.43)	29(23.97)		121(30.48)
	2 or more	76(37.62)	21(28.38)	70(57.85)		167(42.07)
Number of treatment-related symptoms, n(%)	<5	96(47.52)	29(39.19)	40(33.06)	0.03	165(41.56)
	>=5	106(52.48)	45(60.81)	81(66.94)		232(58.44)

Characteristics	NHW (n=202)	More acculturated Chinese (n=74)	Less acculturated Chinese (n=121)	P-value	Overall N=397
Had surgery, n(%)[†]	201(99.50)	73(98.65)	118(97.52)	0.27	392(98.74)
Had chemotherapy, n(%)	39(21.08)	22(31.43)	33(28.45)	0.15	94(25.34)
Had radiotherapy, n(%)	98(48.51)	37(50.00)	54(44.63)	0.72	189(47.61)
Had hormone therapy, n(%)	122(60.40)	48(64.86)	81(66.94)	0.47	251(63.22)

[¥] Annual household income had missing values ~8%.

[†] Fisher exact test was used because of the 50% cells' counts are less than 5 or zero-count cell.

Table 2

Odds Ratio (OR) Estimates of Adherence to PA Recommendations

Independent Variables		ORs	95% CI		P-value
			Lower	Upper	
Race/Acculturation	More acculturated Chinese vs. NHW	0.69	0.35	1.36	0.28
	Less acculturated Chinese vs. NHW	0.38	0.19	0.75	**<0.01**
BMI index	Underweight *vs.* Normal	0.43	0.15	1.27	0.13
	Overweight *vs.* Normal	0.55	0.32	0.95	**0.03**
	Obese *vs.* Normal	0.25	0.12	0.53	**<0.01**
Employ status	Yes *vs.* No	0.90	0.53	1.54	0.71
Health insurance	Private *vs.* Government plans	1.22	0.59	2.51	0.59
Education	High school vs. College	1.19	0.61	2.32	0.61
Cancer stage	Stage I vs. Stage 0	1.60	0.88	2.91	0.13
	Stage II vs. Stage 0	0.89	0.40	2.01	0.79
	Stage III vs. Stage 0	0.96	0.43	2.17	0.93
Comorbidity	None vs. 1 condition	0.63	0.31	1.27	0.20
	2+ vs. 1 condition	0.47	0.25	0.86	**0.02**
Time from diagnosis	<24 months vs. >36 months	1.25	0.68	2.31	0.48
	24-36 months vs. >36 months	1.24	0.70	2.21	0.47
Treatment-related symptoms	5 vs. <5 symptoms	1.00	0.59	1.68	0.99

Notes. The OR of a variable was estimated when adjusting for all other variables. Bold value indicates that the null hypothesis was rejected at the 5% significant level (p<0.05).