Published in final edited form as:
Cancer Epidemiol Biomarkers Prev. 2008 June ; 17(6): 1527–1534. doi:10.1158/1055-9965.EPI-08-0028.

Familial and Perceived Risk of Breast Cancer in Relation to Use of Complementary Medicine

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Abstract

Aim—To examine use of complementary and alternative medicine (CAM) by women with varying levels of familial and perceived risk of breast cancer with the goal of preventing breast cancer.

Methods—Cross-sectional data on CAM use were collected on 2198 women (mean age 63) personally unaffected by breast cancer in the Minnesota Breast Cancer Family Study. CAM use was compared across women at high, moderate, or average risk based on family history, as well as across categories of perceived risk of breast cancer. CAM use was also examined in relation to screening and general health behaviors, worry about breast cancer, and optimism.

Results—Half (49.5%) of the women reported using at least one CAM modality with the intent of preventing breast cancer. Univariate analyses indicated that greater overall CAM use was related to greater perceived risk ($p = .018$), more general health behaviors ($p < .0001$), more breast cancer screening behaviors ($p = .0002$), greater optimism ($p = .0002$) and higher educational attainment ($p < .0001$). Multivariate analysis revealed that general health behaviors ($p < .0001$), education ($p = .0027$), and optimism ($p = .037$) were significant predictors of CAM use when in the same model with perceived risk and breast cancer screening behaviors.

Conclusions—Many women use CAM with the goal of preventing breast cancer. General health promoting behaviors, education, and optimism predict CAM use. Evidence-based guidance is needed for the public and health care providers on the potential and limitations of specific CAM approaches to impact cancer risk.

Breast cancer follows lung cancer as the second leading cause of cancer deaths among women in the United States, and it is the most commonly diagnosed cancer among women after nonmelanoma skin cancer[1]. In 2007, an estimated 178,480 new cases of invasive breast cancer were diagnosed in women, and there were 40,460 deaths from breast cancer[1]. Case-control and cohort studies of volunteer and population-based samples examining family history of breast cancer as a risk factor have found that, in general, the greater the number of affected relatives and the closer the biologic relationship, the greater the risk of breast cancer[2-4]. A pooled analysis of 38 studies indicated the relative risk of breast cancer conferred by a first-degree relative with breast cancer was 2.1 (95% confidence interval CI, 2.0-2.2) [4]. Many women with daughters, sisters, or mothers with breast cancer live with the knowledge that they face a higher than average risk of developing breast cancer due to their family history. The Health Belief Model[5,6] predicts that women who know they have a family history of breast cancer, particularly in a first degree relative, might be motivated by

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the knowledge of their heightened risk to engage in more behaviors aimed at preventing breast cancer, relative to other women. Moreover, the greater the perceived susceptibility to developing breast cancer, the more likely women would be to modify their behavior to reduce their risk.

We recently examined this hypothesis using cross-sectional data from the Minnesota Breast Cancer Family Study[7]. Our initial focus on medical preventive behaviors (mammography adherence, antiestrogen use, and prophylactic surgery) and lifestyle behaviors (physical activity, smoking, alcohol consumption, and diet) indicated that women at high familial risk were more likely to undertake medical preventive behaviors, but not more likely to engage in healthy preventive lifestyle behaviors, relative to women at moderate or average familial risk[7].

Complementary and alternative medicine comprises an additional category of health behaviors in which individuals may engage with the intention of reducing their risk of cancer.

Complementary and alternative medicine (CAM) is defined by the National Institutes of Health, National Center for Complementary and Alternative Medicine (NCCAM) as a group of diverse medical and health care systems, practices, and products that are not presently considered to be part of conventional medicine[8]. Examples of commonly used CAM therapies include biologically-based approaches such as herbal remedies, dietary supplements, or special diets, body-based approaches such as chiropractic manipulations or massage therapy, and mind-body practices such as prayer, meditation, yoga, and relaxation techniques. National Health Interview Survey data from 2002 suggest close to two thirds of Americans used some form of CAM during the past year for their health when prayer was included in the operational definition of CAM, and one third used CAM when prayer use was excluded[9]. Most people use CAM in conjunction with conventional medical care, rather than as an alternative to medical care[9,10]. Surveys of women who have been diagnosed with breast cancer show high levels of CAM use and links between CAM use and women's perceived risk of cancer recurrence, hopes for preventing recurrence, and hopes of improving quality and quantity of life[11-16].

Little is known about CAM use by women who have not been diagnosed with breast cancer but who know themselves to be at increased risk for the disease based on family history. Using cross-sectional data from the Minnesota Breast Cancer Family Study[17, 18] the current study examined the associations between familial and perceived risk of breast cancer and CAM use with the intended purpose of preventing breast cancer in women without a personal history of the disease. Our earlier results in which familial risk of breast cancer was not linked with preventive lifestyle health behaviors[7] suggested the possibility that CAM use with the goal of cancer prevention also might not be associated with familial risk. However, based on the Health Belief Model[5] and on recent health behavior literature,[19,20] we expected to find that higher perceived risk would be associated with increased CAM use. We also examined the relationship of general health behaviors, breast cancer screening behaviors, worry about breast cancer, optimism, and demographic characteristics to CAM use. We expected increased CAM use would be associated with more general health behaviors, more breast cancer screening behaviors, greater worry about breast cancer, and greater optimism. Finally, we expected younger age would predict CAM use, as would higher education.

METHODS

Study population

Details of the Minnesota Breast Cancer Family Study baseline enrollment[17] and first follow-up[18] have been published previously. Briefly, a case-control family study was initiated in 1944 at the Dight Institute for Human Genetics at the University of Minnesota. Data from 544 consecutive breast cancer probands ascertained at the Tumor Clinic of the University of Minnesota Hospital between 1944 and 1952 were collected. Between 1990 and 1996, 426 (78%) families were updated; each proband's first and second degree female relatives and spouses of male relatives ("marry-ins") were contacted, and extensive risk factor data were collected by telephone interview on 6,194 women (94.6% of those eligible).

Additional follow-ups of the families were conducted in 2001 and 2003. The 2003 survey included an update of demographic data and cancer status, as well as a questions related to CAM use. Non-respondents to the mailed survey were contacted by telephone to complete an abbreviated survey that included only priority questions on breast cancer status. Of the 4493 women alive and eligible to complete the 2003 survey, 3158 (70.3%) participated, 671 refused (14.9%), 310 (6.9%) we were unable to contact after repeated attempts (contact information presumed to be accurate), and 354 (7.9%) were lost to follow-up. Of those participating, 2479 completed the full survey, and 699 completed the abbreviated survey. Data on CAM use was available on 2365 subjects. In the current analysis, participants with a personal history of breast cancer (n = 167) were excluded from the analyses. Therefore, CAM data available for a total of 2198 women personally unaffected by breast cancer form the basis of this report.

Measures

Familial risk

We classified family history into three categories: "high risk", "moderate risk", and "average risk." "High risk" was defined as first or second degree relatives of a breast cancer proband related to at least two women with breast cancer, at least one of whom is a first degree relative. "Moderate risk" was defined as first or second degree relatives of a breast cancer proband having either: a) a single first degree relative with breast cancer and no second degree relatives with breast cancer; or b) no first degree relatives with breast cancer but more than one second degree relative with breast cancer. Second degree relatives of a breast cancer proband without other first or second degree relatives with breast cancer (n = 430) were excluded from analyses on the relationship of family history to CAM use due to their relatively weak family history. Only the side of the family to which the original breast cancer-affected proband belonged was considered. "Average risk" was defined as women who had married into the cohort and were assumed to have the population risk level for breast cancer.

Perceived Risk

Perceived risk was assessed with the question "How would you rate your risk of breast cancer?" with response options of "No risk," "Low risk," "Average risk," "High risk," and "Extremely high risk." For statistical analyses, the five levels of perceived risk were collapsed to three levels: No perceived risk, Low perceived risk (combining Low and Average risk), and High perceived risk (combining High risk and Extremely high risk). This approach to assessment of perceived risk was similar to that used in previous studies[21].

CAM Use with Goal of Preventing Breast Cancer

The question for use of CAM modalities was worded as follows: “Have you used any other approaches to prevent breast cancer? (These may not be medically proven to be effective in cancer prevention) (Mark all that apply)”, with response options including “Began or increased intake of soy products”, “Began or increased intake of organic foods”, “Began or increased intake of vitamin supplements”, “Began or increased intake of herbal supplements or remedies (e.g., essiac, shark cartilage, St. John's Wort, CoQ10)”, “Practiced mind-body therapies (e.g., yoga, meditation)”, “Used relaxation techniques or massage”, “Underwent chiropractic therapy”, “Increased spirituality or prayer”, “Support group involvement”, “Other, specify”, and “None of above.” Responses to “Other, specify” were not analyzed in the current study, nor were responses to “Support group involvement,”since access to support groups is now part of conventional multidisciplinary cancer care. In statistical analyses, use of any of the first eight approaches was scored as “any CAM,” and sub-categories of CAM were developed by grouping soy products, organic foods, vitamins, and herbals into a category called “biologically-based CAM,” and grouping mind-body, relaxation or massage, chiropractic, and spirituality or prayer into a category called “mind-body or body-based CAM.”

General Health Behaviors

Data on general health behaviors were collected by asking “which of the following approaches have you used for your overall health or for the prevention of breast cancer? (Mark all that apply)”, with options of “started or increased regular exercise (at least a total of 3 hours per week)”, “lost 10 or more pounds (as a result of diet or exercise – not illness)”, “stopped smoking”, “decreased alcohol intake to less than or equal to 1 drink per day”, “increased daily intake of fruits and vegetables in diet”, “decreased red meat intake to less than or equal to 1 serving per day, ” “decreased fat in diet.”

Breast Cancer Screening Behaviors

The following three questions with response options of “No” and “Yes” comprised the breast cancer screening behaviors: “Have you performed breast self-examination for the detection of breast cancer?”; “Have you had a breast exam by a clinician for the detection of breast cancer?”; “Have you had a mammogram for the detection of breast cancer?”

Worry About Breast Cancer

Worry about breast cancer was assessed with the question “How often do you worry about breast cancer?” with response options of “Not at all”, “A little”, “Some”, “Often”, “Almost all the time”, coded as values 0, 1, 2, 3, and 4. Similar brief scales have been used in previous research to assess worry about a particular domain.[20]

Optimism

Dispositional optimism was assessed by asking respondents to rate their level of agreement with the statements from the Life Orientation Test-Revised (LOT-R[22]). For example, respondents rated their agreement with the statement “In uncertain times, I usually expect the best.” Response options for each statement included “I agree a lot,” “I agree a little,” “I neither agree nor disagree,” “I disagree a little,” and “I disagree a lot,” with values of 1 through 5, respectively. A sum of responses to LOT-R items 1 (reverse scored), 3, 4 (reverse scored), 7, 9, and 10 (reverse scored) was used to indicate the degree of optimism, such that a higher score equated to higher optimism. The possible value of the optimism score ranges from 6 to 30.

Statistical Analysis

Descriptive information on demographic variables was summarized using frequencies and percentages for all categorical variables, and means and standard deviations for continuous variables. Standard contingency tables were generated for the categorical variables versus using any CAM, and CAM subgroups. Cell frequencies and percentages are reported. P-values, odds ratios and 95% confidence intervals for odds ratio estimates were obtained using Chi-square tests and Fisher's exact tests (for those with cell counts less than or equal to five). For both categorical and continuous variables, likelihood ratio tests were applied to assess the significance of the overall association between each variable and CAM modalities.

Age, education, familial risk, and perceived risk were treated as categorical variables. Questions comprising the general health behaviors and the breast cancer screening behaviors were individually assessed for correlation with CAM use. In addition, composite scores were created to summarize the general health behaviors and the breast cancer screening behaviors. The general health behavior score was defined as the number of general health behaviors endorsed, including: 1) started or increased exercise; 2) lost 10 or more pounds; 3) stopped smoking; 4) decreased alcohol intake; and 5) any dietary endorsement, for which, the three diet questions (increased fruits and vegetables intake, decreased red meat intake, and decreased fat intake) were combined such that endorsement of change in one or more of the dietary items contributed one point to the general health behavior score. Thus, the general health behavior score has possible values from 0 to 5. Due to the small number of women implementing all five approaches (1.29%), values of five were truncated to four. The breast cancer screening behavior score was the number of breast cancer screening behaviors endorsed, with possible values from 0 to 3. Due to the small number of women not using any of the approaches (1.06%), values of zero and one were combined. Scores were treated as continuous variables when assessing the association of the general health behaviors and the breast cancer screening behaviors with CAM use. Worry about breast cancer score (range 0-4) and optimism score (range 6-30) were considered as continuous variables.

We also carried out multivariate analyses by including education, perceived risk, general health behaviors (score), breast cancer screening behaviors (score), and optimism (score) in logistic regression models to predict CAM use. The backward selection procedure was used to finalize the models that contain simultaneously significant predicting factors of CAM use. In this procedure, we started with fitting a logistic regression model with all the variables of interest. The least significant variable was then dropped, successively refitting reduced models until all remaining variables were significant. Analyses were carried out using the Statistical Analysis Software (SAS Institute, Inc., Cary, NC).

Results

Respondent Demographic Characteristics

The mean age of participants was 62.7 years (SD = 13.6, range = 28 - 99), with 75% of the sample over the age of 52. Nearly all participants were white. The majority of participants were married and had received some college education or graduated from high school.

CAM Use

Respondent's use of CAM is described in Table 1 in relation to CAM use overall as well as the subcategories of biologically-based CAM and mind-body or body-based CAM. Of the final sample of 2198 women in the current study, 1089 (49.5%) reported using at least one CAM modality for the intended purpose of preventing breast cancer. The mean number of CAM modalities used in the sample overall was 1.02. The mean number of CAM modalities

used among CAM users only was 2.06. Among those using CAM, 41.7% used only one form of CAM, 32% used two forms of CAM, 14.7% used three, and 11.6% used more than three forms of CAM. Beginning or increasing vitamins or increased spirituality or prayer were the most commonly used complementary therapies (n = 993). Less than 10% of the respondents reported using any one of the other CAM approaches for cancer prevention. Higher educational attainment was associated with higher overall CAM ($p < .0001$), including higher use of biologically-based CAM ($p < .0001$) as well as higher use of mind-body and body-based CAM ($p < .0001$ value). Age did not approach significance as a correlate of CAM use ($p = .19$).

Familial risk of breast cancer, as determined by family history, is indicated in relation to CAM use in Table 2. Familial risk was not significantly associated with CAM use overall ($p = .21$) or biologically based CAM ($p = .36$). However, moderate familial risk was associated with increased use of chiropractic and herbal supplements, relative to average familial risk ($p = .0083$ and $p = .017$, respectively). Also, high familial risk was associated with increased use of mind-body or body based CAM, relative to average familial risk ($p = .041$). This association was mainly driven by spirituality and prayer ($p = .029$). Using all the subjects (both CAM users and non-users), the mean number of CAM use is 0.96 (S.D. = 1.34), 1.08 (S.D. = 1.47) and 1.04 (S.D. = 1.24) in the average, moderate, and high familial risk groups. The difference in the mean number of CAM use among the risk groups is insignificant ($p=0.23$).

Perceived risk of breast cancer in relation to CAM use is illustrated in Table 3. Differences in CAM use between women perceiving themselves to be at no risk and low risk were not statistically significant ($p = .061$). However, women who perceived themselves to be at high risk were 1.5 times more likely to engage in CAM use than women who perceived themselves at no risk ($p = .018$). Perceived risk was not significantly associated with biologically based CAM ($p = .13$). However, it was associated with mind-body or body based CAM ($p = .046$), mainly due to the association of high perceived risk with increased use of mind-body or body-based CAM, relative to no perceived risk ($p = .017$). Using all the subjects (both CAM users and non-users), the mean number of CAM use is 0.82 (S.D. = 1.27), 1.04 (S.D. = 1.39) and 1.06 (S.D. = 1.29) in the no perceived risk, low perceived risk, and high perceived risk groups. The difference in the mean number of CAM use among the perceived risk groups is insignificant (marginally significant, $p=0.062$).

General health behaviors were strongly and consistently associated with CAM use (Table 4), when the general health behavior composite score was examined. For one unit increase in the general health behavior score, the odds of CAM use increases by a factor of 1.72 (95% CI = 1.58-1.87, $p < .0001$). When individual health behaviors were examined, women who reported CAM use were significantly more likely to have started or increased exercise, lost weight intentionally, decreased alcohol intake, increased intake of fruits and vegetables, and decreased intake of red meat and fat.

Breast cancer screening behaviors were also associated with CAM use (Table 4), when the breast cancer screening behavior composite score was examined. For every unit increase in the breast cancer screening behavior score, the odds of using CAM increases by a factor of 1.33 (95% CI = 1.15-1.54, $p = .0002$). When individual breast cancer screening behaviors were examined, women who reported CAM use were significantly more likely to have used breast self-exams, clinical breast exams, and mammography.

Worry about breast cancer was not associated with CAM use at a level reaching statistical significance ($p = .054$). CAM users averaged a score of 2.22 (SD = 0.91), compared to 2.14 (SD = 0.93) for others.

Optimism was associated with significantly increased overall CAM use (p = .0002), as well as with the subcategories of biologically-based (p = .0009) and mind-body or body-based CAM (p < 0.0001). Overall CAM users averaged a score of 23.4 (SD = 4.7), compared to 22.6 (SD = 5.1) for those not using any CAM.

Predictors of CAM Use

Results indicated that only general health behaviors (p < .0001), education (p = .0027), and optimism (p = .037) remained significant predictors of CAM use when all variables significantly associated with CAM use at the univariate level (specifically perceived risk, general health behaviors, breast cancer screening behaviors, education, and optimism) were examined in a multivariate logistic regression using a backward selection algorithm. When considering the same set of variables in a multivariate analysis for only biologically-based CAM use, general health behaviors (p < .0001) and education (p = .0014) were significant predictors. For mind-body and body-based CAM use, multivariate analysis revealed that general health behaviors (p < .0001), education (p = .012), and optimism (p = .005) were significant predictors. Multivariate adjusted odds ratios are presented in Table 5.

Discussion

The primary aim of the current analysis was to fill a gap in knowledge about associations between familial and perceived risk of breast cancer, and the use of complementary and alternative medicine (CAM) with the intended purpose of preventing the disease by women without a personal history of breast cancer. We did not find a relationship between familial risk and CAM use overall, although increased familial risk was associated with greater use of specific CAM modalities including chiropractic, herbal supplements, and increased spirituality or prayer. Thus, the current results are consistent with our earlier work[7], suggesting that higher familial risk does not bear a consistent, strong relationship to preventive health behavior, whether those behaviors are evidence-based recommendations such as consuming fruits and vegetables and engaging in physical activities, or less-well studied CAM approaches used by women with the intent of preventing cancer such as consuming organically grown foods or practicing mind-body wellness techniques such as yoga or meditation. In contrast to risk based on family history, women's greater perceived risk of breast cancer was associated with greater use of CAM overall. These findings are consistent with the Health Belief Model [5,6] and a large body of research linking perceived risk to increased health protective behaviors[19, 20].

We anticipated a relationship between CAM use and evidence-based behaviors aimed at overall health or reduction of cancer risk, such as exercising regularly, limiting consumption of fats and red meat, and increasing intake of fruits and vegetables. Indeed, strong, consistent associations were found between CAM use and these other health behaviors. Women engaging in one or more general health behavior were nearly five times as likely as other women to use CAM. As expected, breast cancer screening behaviors such as breast self-exam, clinician exam, and screening mammography were all positively related to CAM use. However, relationships between breast cancer screening behaviors and CAM use were less strong and consistent than those between general healthy lifestyle behaviors and CAM.

A previous study[23] reported on CAM use for the intended purpose of cancer prevention by 236 women with a documented personal or family history of breast, ovarian, or other cancer consistent with BRCA1/2 heredity with posterior probability of carrying an altered gene of greater than or equal to 10 percent. Results indicated cancer survivors in the group (n = 132) reported significantly more use of CAM with the goal of cancer prevention than did women who had not had a cancer diagnosis (n = 104) (60% versus 42%, respectively). Among women without a personal history of cancer, worrying about one's cancer risk was

associated with increased CAM use, and CAM users were more likely than non-CAM users to worry about their cancer risk (45% versus 24%). By contrast, our results obtained with a much larger sample of women without a personal history of cancer indicate only a nonsignificant trend toward a relationship between increased worry and increased CAM use.

Consistent with prior research showing an association between optimism and health behaviors[24], optimism in our sample was associated with significantly increased CAM use. Contrary to our expectations, age was not associated with CAM use, although this unusual finding may be explained by the fact that the great majority of our participants were older, with a mean age of 63, and the age range in our study was truncated, with less than five percent of our sample under age 40. As expected, increased education was associated with increased CAM use.

Thus, at the univariate level, perceived risk, engaging in general health behaviors for overall health or to prevent breast cancer, engaging in breast cancer screening behaviors, educational attainment, and dispositional optimism were associated with CAM use overall. Of these five variables, only general health behaviors, education, and optimism remained significant predictors of CAM use when included in a multivariate logistic analysis. Perceived risk and engaging in breast cancer screening behaviors dropped out, likely owing to correlation with variables retained in the model. Our results are consistent with previous population-based survey findings in healthy samples where CAM use correlated with general health behaviors[25] and education[9, 10].

A strength of our study is our large sample size; however, our results can not be presumed to generalize to groups with demographic characteristics different from our sample. Our results are based on a sample which was made up almost entirely of older, white women, most of whom were married and had completed at least a high school education. Since younger women have been found to use more CAM,[26] the older age of our sample, in which the mean age was 63, constitutes a limitation to the generalizability of our findings, which might have been different in a younger age cohort. Another potential limitation of the current study relates to the possible misclassification of some individuals with regard to their familial risk of breast cancer due to family history. Only the side of the family to which the original breast cancer-affected proband belonged was considered during classification to category of familial risk. Women who married into the cohort were assumed to have the population average risk level for breast cancer but some of them did have a family history of breast cancer; therefore, some misclassification may have occurred which means the observed differences may be conservative. A possible limitation of the data set is that only a subset of potentially eligible respondents contributed data on CAM use, and it is unknown if these respondents mirror the whole sample. An additional limitation of our data stems from the fact that we did not inquire about the frequency of use of CAM, dose of CAM at each time point, or duration of use of CAM modalities. Particularly with regard to vitamin use, such data would have contributed important information, including whether or not women used high doses of vitamins, which we are not able to determine from our data. Finally, our analyses were exploratory and involved multiple testing for which we did not adjust statistical significance; however, our directional predictions were largely supported.

Several important areas for future research are indicated by the current results. We found that half the women in our large sample used CAM therapies with the intended goal of preventing breast cancer, and women who perceived themselves to be at elevated risk of breast cancer were more likely to use CAM. It is important to note that there is either little scientific evidence or a lack of consistent findings to support or refute the potential of most CAM therapies to contribute to prevention of breast cancer. Use of vitamins with the goal of preventing breast cancer was the most common CAM approach reported in our study.

However, there is a lack of evidence at this time that supplements can reduce breast cancer risk, and existing evidence that use of high-dose supplements can actually increase some other types of cancer risk, leading experts to conclude that whole food is the best source of vitamins and minerals[27]. Evidence-based guidance is needed about the safety, efficacy, and limitations of CAM therapies in general and specifically relating to their potential to impact cancer risk. Future research should also address the possibility that some women opt for CAM therapies they believe are preventive in lieu of evidence-based general health behaviors or breast cancer screening behaviors. Our results also suggest that it could be worthwhile to develop and test educational interventions designed to help the public evaluate claims for CAM for cancer prevention. One potentially fruitful area could be to test the acceptability and impact of incorporating references to CAM approaches into educational messages targeting women with the goal of increasing their breast cancer screening behaviors.

Finally, there is a burgeoning area of research on the topic of physician competency in communication with patients about CAM use. Our results suggest the importance of health care providers developing specific competencies in the area of inquiring about patients' CAM use and health behaviors with the goal of cancer prevention, and providing evidence-based recommendations on CAM to patients.

Acknowledgments

Support: P01 CA82267

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Table 1

Demographic data in relationship to CAM use.

	Total pop (n = 2198)	CAM Use, N (percentage)			Mind-body or body based (604, 27.5)
		None (1109, 50.5)	Any (1089, 49.5)	Biologically-based (933, 42.4)	
	Number (Percentage)				
Age Groups					
18-29	4 (0.2)	3 (0.3)	1 (0.1)	1 (0.1)	1 (0.2)
30-39	104 (4.7)	60 (5.4)	44 (4.0)	38 (4.1)	26 (4.3)
40-49	353 (16.1)	194 (17.5)	159 (14.6)	131 (14.0)	100 (16.6)
50-59	487 (22.2)	230 (20.7)	257 (23.6)	227 (24.3)	133 (22.0)
60-69	565 (25.7)	274 (24.7)	291 (26.7)	258 (27.7)	156 (25.8)
70-84	614 (27.9)	312 (28.1)	302 (27.7)	248 (26.6)	170 (28.2)
≥ 85	71 (3.2)	36 (3.3)	35 (3.2)	30 (3.2)	18 (3.0)
Ethnicity					
White	1814 (98.6)	907 (98.8)	907 (98.5)	776 (98.6)	499 (98.0)
Black	1 (0.05)	1 (0.1)	0 (0.0)	0 (0.0)	0 (0.0)
Hispanic	2 (0.1)	1 (0.1)	1 (0.1)	0 (0.0)	1 (0.2)
American Indian	9 (0.5)	3 (0.3)	6 (0.7)	5 (0.6)	3 (0.6)
Asian	2 (0.1)	2 (0.2)	0 (0.0)	0 (0.0)	0 (0.0)
Other	11 (0.6)	4 (0.4)	7 (0.8)	6 (0.8)	6 (1.2)
Marital status					
Married	1776 (81.0)	909 (82.0)	867 (79.8)	745 (80.1)	474 (78.6)
Living together	47 (2.1)	22 (2.0)	25 (2.3)	21 (2.3)	19 (3.2)
Divorced	142 (6.5)	62 (5.6)	80 (7.4)	64 (6.9)	53 (8.8)
Widowed	173 (7.9)	84 (7.6)	89 (8.2)	79 (8.5)	39 (6.5)
Never married	56 (2.6)	31 (2.8)	25 (2.3)	21 (2.3)	18 (3.0)
Education					
Less than high school	237 (10.8)	136 (12.3)	101 (9.3)	83 (8.9)	56 (9.3)
High school grad	803 (36.6)	452 (40.8)	351 (32.3)	299 (32.1)	182 (30.1)
Some college	747 (34.0)	338 (30.5)	409 (37.6)	354 (38.0)	226 (37.4)
College grad +	408 (18.6)	182 (16.4)	226 (20.8)	195 (21.0)	140 (23.2)

Note: The subcategories of biologically-based and mind-body or body based are not mutually exclusive; thus, numbers may be greater than the any CAM use column

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Table 2

Relationship of familial risk to CAM use (n = 1869)*

	Total Pop (n = 2198)		Average Risk** (n = 920)		Moderate Risk (n = 682)			High Risk (n = 267)		
	Number (n)	Percent (%)	Number (n)	Percent (%)	Number (n)	Percent (%)	OR (95% CI)	Number (n)	Percent (%)	OR (95% CI)
Any CAM modality	1089	49.5	444	48.3	333	48.8	1.02 (0.84, 1.25)	145	54.3	1.27 (0.97, 1.67)
Biologically-based	933	42.4	378	41.1	295	43.3	1.09 (0.89, 1.34)	122	45.7	1.21 (0.92, 1.59)
Soy products	261	11.9	113	12.3	87	12.8	1.04 (0.77, 1.41)	24	9.0	0.71 (0.44, 1.12)
Organic foods	135	6.14	51	5.5	52	7.6	1.41 (0.94, 2.10)	16	6.0	1.09 (0.61, 1.94)
Vitamins	821	37.4	332	36.1	256	37.5	1.06 (0.87, 1.31)	111	41.6	1.26 (0.95, 1.66)
Herbal supplements	171	7.8	59	6.4	66	9.7	1.56 (1.08, 2.26)	18	6.7	1.06 (0.61, 1.82)
Mind-body or body based	604	27.5	238	25.9	184	27.0	1.06 (0.85, 1.33)	86	32.2	1.36 (1.01, 1.83)
Yoga/meditation	103	4.7	39	4.2	39	5.7	1.37 (0.87, 2.16)	8	3.0	0.70 (0.32, 1.51)
Relaxation/massage	155	7.1	58	6.3	52	7.6	1.23 (0.83, 1.81)	16	6.0	0.95 (0.54,1.68)
Chiropractic	121	5.5	39	4.2	50	7.3	1.79 (1.16, 2.75)	11	4.1	0.97 (0.49, 1.92)
Prayer/spirituality	472	21.5	193	21.0	134	19.7	0.92 (0.72, 1.18)	73	27.3	1.42 (1.04, 1.94)

*Information about both CAM use and familial risk, defined by family history, was available on n = 1869 subjects; the differences between the total number of subjects and frequencies shown in the table are due to missing data.

**Average risk serves as the reference group for each comparison.

Table 3

Relationship of perceived risk to CAM use (n = 2184)*

	Total Pop (n = 2198)		No Perceived Risk* (n = 228)		Low Perceived Risk (n = 1616)			High Perceived Risk (n = 340)		
	Number (n)	Percent (%)	Number (n)	Percent (%)	Number (n)	Percent (%)	OR (95% CI)	Number (n)	Percent (%)	OR (95% CI)
Any CAM modality	1089	49.5	99	43.4	803	49.7	1.29 (0.97, 1.70)	182	53.5	1.50 (1.07, 2.10)
Biologically-based	933	42.4	83	36.4	695	43.0	1.32 (0.99, 1.76)	151	44.4	1.40 (0.99, 1.97)
Soy products	261	11.9	22	9.7	193	11.9	1.27 (0.80, 2.02)	46	13.5	1.47 (0.86, 2.51)
Organic foods	135	6.14	11	4.8	103	6.4	1.34 (0.71, 2.54)	21	6.2	1.30 (0.61, 2.75)
Vitamins	821	37.4	69	30.3	617	38.2	1.42 (1.05, 1.92)	131	38.5	1.44 (1.01, 2.06)
Herbal supplements	171	7.8	14	6.1	133	8.2	1.37 (0.78, 2.42)	23	6.8	1.11 (0.56, 2.20)
Mind-body or body based	604	27.5	52	22.8	439	27.2	1.26 (0.91, 1.75)	109	32.1	1.60 (1.09, 2.35)
Yoga/meditation	103	4.7	7	3.1	82	5.1	1.69 (0.77, 3.70)	14	4.1	1.36 (0.54, 3.41)
Relaxation/massage	155	7.1	11	4.8	114	7.1	1.50 (0.79, 2.83)	30	8.8	1.91 (0.94, 3.89)
Chiropractic	121	5.5	12	5.3	93	5.8	1.10 (0.59, 2.04)	16	4.7	0.89 (0.41, 1.92)
Prayer/spirituality	472	21.5	41	18.0	348	21.5	1.25 (0.88, 1.79)	79	23.2	1.38 (0.91, 2.10)

*Information about both CAM use and self-reported perceived risk was available on n = 2184 subjects; the differences between the total number of subjects and frequencies shown in the table are due to missing data.

*Perception of no risk serves as the reference group for each comparison.

Table 4

Association of CAM use with general health behaviors and breast cancer screening behaviors

		Any CAM use		No CAM use		
		Number (n)	Percent (%)	Number (n)	Percent (%)	OR (95% CI)
General health behavior						
Composite score	0	78	21.5	285	78.5	NA*
	1	303	45.0	370	55.0	NA*
	2	389	57.2	291	42.8	NA*
	3	224	63.5	129	36.5	NA*
	4	90	73.2	33	26.8	NA*
Individual behaviors						
Start or increase exercise	None	551	42.0	760	58.0	1.00 (reference)
	Any	533	60.5	348	39.5	2.11 (1.78, 2.51)
Lost 10+ lbs	None	748	45.4	898	54.6	1.00 (reference)
	Any	336	61.5	210	38.5	1.92 (1.58, 2.34)
Stop smoking	None	922	48.8	966	51.2	1.00 (reference)
	Any	162	53.3	142	46.7	1.20 (0.94, 1.52)
Decrease alcohol intake	None	894	47.0	1009	53.0	1.00 (reference)
	Any	190	65.7	99	34.3	2.17 (1.67, 2.81)
Increase fruits/veggies	None	358	36.4	625	63.6	1.00 (reference)
	Any	726	60.0	483	40.0	2.62 (2.21, 3.12)
Decrease red meat	None	491	39.8	742	60.2	1.00 (reference)
	Any	593	61.8	366	38.2	2.45 (2.06, 2.91)
Decrease fat intake	None	430	39.4	660	60.6	1.00 (reference)
	Any	654	59.4	448	40.6	2.24 (1.89, 2.66)
Breast cancer screening behavior						
Composite score	1	50	39.1	78	60.9	NA**
	2	195	44.0	248	56.0	NA**
	3	844	51.9	783	48.1	NA**
Individual behaviors						
Self breast exam	None	149	44.4	187	55.6	1.00 (reference)
	Any	936	50.5	918	49.5	1.28 (1.01, 1.62)
Clinician breast exam	None	87	42.2	119	57.8	1.00 (reference)
	Any	999	50.4	981	49.6	1.39 (1.04, 1.86)
Mammography	None	55	37.7	91	62.3	1.00 (reference)
	Any	1033	50.4	1018	49.6	1.68 (1.19, 2.37)

*The general health behavior composite score is considered as a continuous variable when assessing the association with CAM use. For one unit increase in the general health behavior score, the odds of CAM use increases by a factor of 1.72 (95% CI = 1.58-1.87).

** The breast cancer screening behavior composite score is considered as a continuous variable when assessing the association with CAM use. For one unit increase in the breast cancer screening behavior score, the odds of using CAM increases by a factor of 1.33 (95% CI = 1.15-1.54).

Table 5

Significant predictors of CAM use

Predictors	Levels	OR (95% CI)		
		Any CAM	Biologically based CAM	Mind-body and body based CAM
Education	Less than high school	1.00 (reference)	1.00 (reference)	1.00 (reference)
	High school graduate	1.01 (0.74, 1.40)	1.06 (0.76, 1.48)	0.98 (0.68, 1.42)
	Some college	1.44 (1.04, 2.00)	1.51 (1.08, 2.10)	1.31 (0.90, 1.89)
	College graduate and higher	1.43 (1.00, 2.05)	1.52 (1.06, 2.17)	1.48 (0.10, 2.21)
General health behavior	With one unit increase	1.72 (1.58, 1.88)	1.72 (1.58, 1.88)	1.48 (1.35, 1.62)
Optimism	With one unit increase	1.02 (1.00, 1.04)	NA*	1.03 (1.01, 1.05)

*Excluded from final model by backward selection