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High use of complementary and alternative medicine among a large cohort of women with a family history of breast cancer: The Sister Study

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Abstract

Purpose—Use of complementary and alternative medicine (CAM) is high among U.S. women, yet information is limited on use among women at increased breast cancer risk. We analyzed CAM use among women with a family history of breast cancer.

Methods—CAM use was analyzed among women enrolled 2003–2009 in the Sister Study cohort. Eligible women were age 35–74, U.S. or Puerto Rican residents, no personal history of breast cancer, and had 1 sister with breast cancer. Baseline data on CAM use in the past year was available for 49,734 women. Logistic regression models examined the association between CAM use and Gail Model breast cancer risk score. Results were compared to female participants in the 2007 National Health Interview Survey (n=7,965).

Results—Among Sister Study participants, there was high use of vitamin/mineral supplements (78.8%), mind/body practices (41.4%), manipulative/body-based practices (31.5%), and botanicals (22.8%). Overall use was higher than the U.S. female population. No association was observed between familial breast cancer risk and CAM use. Black women were more likely to use spirituality/meditation-based CAM modalities, while non-Hispanic white and Asian women were high users of dietary supplements.

Conclusions—In a cohort of women with increased breast cancer risk due to family history, CAM use is higher than women in the general U.S. population and is associated with race/

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ethnicity. Use was not associated with breast cancer risk. Given the high prevalence of CAM use among women at risk for breast cancer, research on the effectiveness of CAM use for disease prevention is needed.

Keywords

Complementary and alternative medicine; breast cancer; breast cancer risk; Gail model

INTRODUCTION

In the U.S., breast cancer ranks first in cancer incidence and second in cancer mortality with 231,840 new cases and 40,290 deaths from breast cancer estimated in 2015[1]. Women who have a first-degree female relative with breast cancer have, on average, a 2.1 fold increased risk of developing breast cancer compared to women without an affected female family member[2]. Evidence suggests that women at high-risk seek out information to modify their lifestyle to reduce breast cancer risk[3]. However, data are limited regarding lifestyle behavior change in this population.

The National Center for Complementary and Integrative Health (NCCIH) defines complementary and alternative medicine (CAM) as the use of natural products, mind-body practices and other approaches that are not used as part of conventional medicine[4,5]. The 2007 National Health Interview Survey (NHIS) reported that CAM use over the past 12 months among women in the US population was 42.8%[6]. Prevalence estimates of CAM use among women at increased risk for breast cancer range from 42% in the U.S.[7] to 50% in other countries[8,9]. A recent systematic review concluded that CAM use ranged from 22% to 82% regardless of whether a woman was at high-risk or average risk for breast cancer[4].

We used data from the Sister Study, a large prospective cohort of 50,884 women who have at least one sister with a history of breast cancer[10] to examine predictors of CAM use. Our *a priori* objective is to describe use of complementary and alternative therapies among women enrolled in the Sister Study and examine whether level of estimated breast cancer risk predicts use. We compared CAM use in the Sister Study population with the general U.S. population as assessed by the 2007 National Health Interview Survey (NHIS).

METHODS

Sister Study Cohort

Design and Population of Sisters Study—The Sister Study[11] (www.sisterstudy.niehs.nih.gov), conducted by the National Institute of Environmental Health Sciences (NIEHS), is a prospective cohort study of 50,884 women who have a sister with breast cancer[12]. Participants were enrolled from 2003 to 2009. Eligible participants were women aged 35 to 74 years who resided in the U.S. or Puerto Rico, had no personal history of breast cancer and had at least one sister with breast cancer. At baseline, participants completed mailed questionnaires and a computer-assisted telephone interview to collect information on demographics, breast cancer risk factors, and CAM use within the

past 12 months. Informed consent, anthropometric data, and blood samples were obtained during a home visit. The study was approved by the NIEHS and Copernicus Group Institutional Review Boards.

Complementary and alternative medicine (CAM) use—The Sister Study baseline questionnaire collected data on CAM use during the prior 12 months. Use of specific forms of CAM was examined using a series of questions on vitamins/minerals (n=19), botanicals (n=22), other natural products (n=15), mind-body medicine (n=4), manipulative and body based therapies (n=3) and other CAM practices (n=2). See Supplemental Table 1 for a list of all CAM forms assessed. For the purposes of this analysis, CAM use was defined as any self-reported use during the previous 12 months. A CAM use index was created by summing the total number of CAM modality categories reported used in the previous 12 months (range: 0–5).

Estimated Breast Cancer risk—Estimated breast cancer risk was assessed in the Sister Study utilizing relative and absolute Gail breast cancer risk scores, which are based upon the NCI's Breast Cancer Risk Assessment Tool (BCRAT) (www.cancer.gov/bcrisktool/). Gail Model risk score estimates are calculated based upon current age, age at menarche, age at first live birth, number of first-degree relatives with a history of breast cancer, and number of previous biopsies [13]. History of atypical hyperplasia was not assessed during the baseline questionnaire and was assigned as unknown for calculation of the Gail Score for all women.

Covariates—Data on demographic and clinical characteristics, breast cancer risk factors, health status, and lifestyle and health behavior characteristics were collected at baseline. Demographic characteristics include age, race/ethnicity, education, employment, marital status, household income, and geographic region. Clinical characteristics and breast cancer risk factors include BMI (based on examiner measurements at home visit), menopausal status, hormone replacement therapy use, oral contraceptive use, last mammography, breast cancer genetic testing, breast cancer chemoprevention use (i.e., use of tamoxifen for primary prevention of breast cancer), number of first degree relatives with breast cancer, parity, history of breast feeding, breast cancer family burden score, perceived stress, and self-perceived health status.

The *Breast Cancer Family Burden Score* is based on the following four variables: having more than one affected sister, having any sister diagnosed < 50 years of age, having an affected mother, and having any sister diagnosed within the past 4 years. Each of the four variables was coded as yes (1) versus no (0) and a composite score was generated for each participant by adding the four values (scores ranged from 0–4).

Perceived level of stress during the past 30 days was measured based on Cohen's Perceived Stress Scale – 4 item (PSS-4) score. The greater the PSS-4 score (ranging from 0–16), the greater an individual's level of perceived stress[14].

Self-perceived health status was based upon a 5-item scale, which included the following items: excellent, very good, good, fair, and poor.

Behavioral lifestyle and health behaviors were evaluated, including fruit and vegetable consumption, total daily caloric intake, percent of total kilocalories from fat per day, alcohol consumption, physical activity, and smoking status. Physical activity was assessed based on self-reported frequency of sports and exercise activities (e.g., walking for exercise, yoga, dance classes, etc.). Dietary intake was assessed using the Block Food Frequency Questionnaire (FFQ) assessing usual consumption over the past 12 months. Alcohol consumption was assessed via self-report.

Statistical Methods—Chi-square analyses were used to assess associations between demographic, clinical and lifestyle characteristics and CAM modality categories. CAM modalities within each category that were used by more than 5% of the Sister Study cohort were examined by race/ethnicity group. Three separate relative risk regression models were used to predict the likelihood of CAM use by estimated Gail Model score. Each model was adjusted for age at enrollment, then additional models were built by evaluating potential confounding demographic and clinical factors such as race/ethnicity, marital status, education, current oral contraceptive use, and health behaviors including alcohol consumption, physical activity and fruit and vegetable intake. Confounders that changed the beta for CAM use by more than 10% remained in the models. Model one controlled for age at enrollment. Model two also controlled for demographic and clinical factors, and model three for these factors plus health behaviors.

National Health Interview Survey (NHIS)

NHIS is a yearly cross sectional survey performed by the Centers for Disease Control[15]. This household based survey utilizes complex sampling procedures in order to obtain a sample that is representative of the U.S. population. The NHIS selects primary sample units within each state, where households are then screened for survey implementation. In the 2007 NHIS dataset, an additional questionnaire assessed CAM use[16]. The CAM questionnaire ascertained detailed information about dietary supplement use within the prior 30 days, and use of mind body, manipulative, and body-based modalities within the prior 12 months. The NHIS dataset was used to compare CAM use among Sister Study participants with the general U.S. population. The NHIS dataset was restricted to women between the ages of 35 and 74 in order to make it comparable to the Sister Study cohort, resulting in a sample size of 7,965. NHIS frequency analyses were weighted for complex survey sampling using SAS version 9.3 (Cary, NC).

RESULTS

Cohort characteristics

The demographic, clinical and lifestyle characteristics of the Sister Study cohort have been previously described[17]. In brief, the majority of women in the Sister Study are non-Hispanic white women (84%) between the ages of 50 and 69 years old (75%), who are employed (65%), married (75%), and have a household income \$50,000 or over (41%). Approximately one third of the women reside in the southern U.S. (33%) and approximately 65% completed either a bachelor's or graduate degree.

Overall CAM use

Overall, CAM use was high in the cohort; 78% of women reported use of vitamin and mineral supplements, 41% reported mind-body practices, 31% reported using manipulative and body based practices, and 23% reported use of botanicals (Table 1). For all CAM categories, use was higher among older women and residents of the western region of the United States. There were minimal differences by education and income.

CAM use by race/ethnicity

Figure 1 shows the distribution of CAM modalities reported by >5% of study participants, by race (see also Supplemental online Table 2). Overall, Asian women were the highest users of almost half (44%) of all CAM modalities studied. The top five modalities used by >5% of the cohort were once-a-day multivitamins, calcium, green tea, spirituality/meditation, and vitamin C. Within these categories, Non-Hispanic whites and Hispanics reported the highest use of once-a-day multivitamins (60.8% and 60.2% respectively); Non-Hispanic white and Hispanic women were the highest users of calcium (56.6% and 56.5% respectively); Asians were the highest users of green tea (60.5%); Black women were the highest users of spirituality/meditation modalities (45.9%); and, Hispanic women were the highest users of vitamin C (30.0%). The modalities most infrequently reported were vitamin B6, echinacea, coenzyme Q10, flaxseed, flaxseed oil, and homeopathy.

CAM use by clinical characteristics

Compared to non-users, users of all CAM modalities had lower BMIs and were more likely to have used estrogen or progesterone replacement therapy (Table 2). Compared to non-users, users of vitamins/minerals were more likely to have used breast cancer chemoprevention, had a lower family burden score, and had higher Gail risk scores. There were few other pronounced differences between CAM user groups for breast cancer screening practices, genetic testing, family history of breast cancer, number of live births, history of breastfeeding, Gail risk scores, perceived stress and self-perceived health.

CAM use by lifestyle characteristics

Lifestyle and health behavior patterns differed between CAM users and non-users (Table 3). For the majority of CAM modalities, compared to non-users, CAM users ate more fruits/vegetables, engaged in more physical activity, and reported more calories per day. Mind-body users consumed less alcohol compared to non-users, but users of vitamins/minerals, botanicals and manipulative/body-based practices consumed more alcohol compared to non-users. Across all categories of CAM modalities, CAM users were less likely to be current smokers compared to non-users, and were more likely to be past-smokers.

CAM use by estimated breast cancer risk

CAM use was not associated with estimated relative or absolute breast cancer risk (Table 4). Multiple potential confounding variables were evaluated including age at enrollment, age/ethnicity, marital status, education, current oral contraceptive use, current smoking status, number of alcoholic drinks per day, and number of metabolic equivalents of exercise per week. After adjustment, no association was observed between any of the CAM modalities

studied and a woman's estimated breast cancer risk score. Estimates changed very little between age-adjusted and other models. Additionally, there was not a meaningful difference between groups in the number of CAM modality categories used as reflected by the CAM index (data not shown).

Comparison of CAM use between Sister Study population and general population of U.S. women

Compared to the general population, women in the Sister Study were more likely to be married, have a higher education level, and have an annual household income in the top two quartiles (reporting income \$50,000 per year or more) (Table 1 and Supplemental online Table 3). Additionally, the Sister Study cohort compared to the NHIS sample was predominantly white (84.3% versus 61% respectively) with far fewer black women (8.3% versus 17%) and Hispanic women (4.8% versus 16%) respectively. The Sister Study cohort and NHIS sample had equal rates of current employment (64.9% and 64% respectively).

Self-reported use of CAM modalities was mostly higher in the Sister Study population, compared to the NHIS sample (Table 1 and Supplemental online Table 3). Overall use of vitamins/minerals (78.8% compared to 56.2%), botanicals (22.8% compared to 8.2%), and manipulative & body-based therapies (31.5% compared to 18.9%) were higher in the Sister Study cohort than in the NHIS cohort respectively, but mind body practices had a higher prevalence of use in the NHIS cohort. Regional patterns for CAM use were similar between the two cohorts, where the Western and Midwest regions had a high frequency of CAM users. Additionally, the usage of specific modalities by race/ethnicity tended to be higher in the Sister Study cohort among all race groups as compared to the NHIS sample (Supplemental online Tables 2 and 4). In contrast, the modality of meditation/spirituality/prayer had higher reported use in the whole NHIS sample (62%) as compared to the Sister Study cohort (35%), a trend that persisted among race/ethnic subgroups.

DISCUSSION

This large cohort study showed very high use of CAM in the past 12 months among U.S. and Puerto Rican women with a family history of breast cancer. CAM use is higher in the Sister Study cohort compared to women in the general U.S. population, potentially reflecting their greater interest in health. Even so, in multivariable models CAM use was not associated with degree of breast cancer risk. We did, however, see statistically significant differences in use of various CAM modalities between racial/ethnic groups. Non-Hispanic whites and Asians surpassed other racial/ethnic groups in use of many dietary supplements and Black women surpassed all other groups in spirituality/meditation-based CAM use.

Potential differences between the Sister Study and 2007 NHIS cohorts could be explained by two factors. First, the Sister Study cohort is a volunteer sample, whereas the NHIS is population-based cohort. The demographics between the two groups are considerably different. Compared to women enrolled in the NHIS, the Sister Study population had a higher percentage of white women (61% versus 84% respectively) and fewer Black (17% versus 8.3%) and Hispanic (16% versus 5%) women. In addition, 41% of women enrolled in the Sister Study were college graduates compared to 17% of women in the NHIS. Women in

the Sister Study were more likely to be married (75% versus 54%), and over one third of women in the Sister Study reported an annual household income equal to or greater than \$100,000 compared to 16% of women in the NHIS population who reported annual household incomes at that level. The second reason is that the Sister Study assessed CAM use over the past 12 months, whereas the 2007 NHIS study assessed use over 30 days[6], which allowed women in the Sister Study to accrue more time to use various CAM modalities.

Numerous studies have commented on the influence of cultural and health beliefs that may affect differences in CAM use among various groups [18,19], which may largely explain the reported differences found in our study. Prior studies have reported that blending of religion and spirituality may drive health-seeking behaviors among African American women[20]. Asians were the highest users of green tea in the Sister Study Cohort, which is in line with previous work showing more than half of Asian Americans are green tea users[20]. Differences in CAM modalities across various racial/ethnic groups were found in previous studies[21], however to our knowledge this is the first study to explore these associations among racial/ethnic groups specifically at increased risk for breast cancer. Some of the differences in CAM use among racial/ethnic groups may be attributed to the cost of certain modalities over others[22]. Socioeconomic factors such as education, income, and insurance status may be drivers of the association seen with race[23,24] or at least contributing to the association with race found in our study. Previous studies have indicated that after adjustment for socioeconomic factors, the effect of race is reduced[25].

Data are limited regarding the association between CAM use and family history of breast cancer or any other cancer[8,2]. Not only did we show that CAM use was not associated with Gail risk score, which many women may not know, but we also showed that CAM use was not associated with family burden score, which women did know. Data on motivating factors for CAM use among unaffected women with a family history of breast cancer are inconsistent. Some studies indicate that the majority or at least half of women at increased risk of breast cancer use CAM with the goal of preventing breast cancer [26,2], while other studies report the majority or at least half of this group of women use CAM for other reasons[8,2]. Increased use of CAM has been associated with increased perceived breast cancer risk, overall healthy behaviors, and greater utilization of cancer screening among high-risk women[4,27,2]. A previous study investigating preventive health behaviors found that unaffected women enrolled in the Minnesota Breast Cancer Family Study who carry a high estimated risk of breast cancer are less likely to engage in healthy lifestyle behaviors related to physical activity, alcohol and smoking, vitamin and supplement use, consumption, caloric intake, compared to those at average or low risk[2]; however they were more likely to engage in medically related activities such as mammographic screening and anti-estrogen use [28]. Based on the previous literature, we hypothesized that women with a family history of breast cancer would have greater CAM use. The study results showed high amounts of use among all participants with no meaningful difference between cancer risk groups. Sister Study participants were motivated to volunteer for a large health study and therefore may be more health conscious than women in the general population, which in part may explain their greater use of CAM. This is consistent with findings from previous analyses showing

that volunteer samples are generally healthier and/or more health conscious versus random samples[29].

Making a direct comparison between the data from the Sister Study and other studies is difficult due to differing definitions of CAM. For example, multivitamins and single dose vitamins and minerals are considered CAM by the NCCIH [5], but are often excluded from the definition of CAM in the literature[6,30]. Findings from studies incorporating the Health Belief Model have shown that women at high risk of breast cancer who are informed and aware of their increased risk are motivated to use preventive services and engage in cancer preventing behaviors based on this knowledge[31,32]. As some CAM modalities have been hypothesized to have chemo-preventive properties, we hypothesized that women with higher breast cancer risk and/or a larger number of relatives with breast cancer would use more CAM. Our findings do not support this hypothesis; we found no meaningful differences between groups. In addition, this analysis does not compare any family history with no family history. However, this study is similar to previous findings that showed that Sister Study participants were not more likely to engage in other healthy behaviors compared to women in the general population[17]. It is possible that perceived breast cancer risk, and not actual risk based on objective measures, has a greater influence on CAM use.

This is the first study to examine the use of CAM modalities among a large cohort of women who have a family history of breast cancer. The Sister Study collected extensive information on family history of breast cancer, breast cancer risk factors as well as CAM use. We were able to use a public access dataset to compare use in this cohort to women in the general U.S. population. However, we lacked information regarding perceived breast cancer risk and CAM use was self-reported, allowing for potential misclassification. There were some limitations in comparing the Sister Study data and the NHIS data due to differences in questionnaires for assessing CAM use. For specific supplements including vitamins, minerals, botanicals and other natural products, the NHIS questionnaire assesses use within the past 30 days while the Sister Study questionnaire assesses use within the last 12 months. The NHIS questionnaire did not collect information on certain supplements, such as beta-carotene, that are included in the Sister Study. This may have resulted in an underestimate of CAM use in the NHIS cohort compared to the Sister Study. Despite these limitations, the NHIS dataset is the best comparison group available for comparing CAM use between the Sister Study cohort and the general U.S. population.

In summary, we found a high use of CAM modalities among a large group of women who have at least one first degree relative with breast cancer, but CAM use was unrelated to estimated breast cancer risk. The use of these specific CAM modalities is associated with race, where usage patterns for specific dietary supplements differed by racial/ethnic subgroup. Additionally this cohort of women tended to use more CAM than was seen in the general population of women the same age, except for the modality of meditation/prayer, which was used more frequently by women in the NHIS sample. Future studies need to assess whether high prevalence of CAM use is associated with prevention of breast cancer and other disease outcomes in women at increased risk of breast cancer.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Figure 1.

Table 1

Demographic characteristics of Sisters Study participants, by CAM use

	Total	Vitamins/Minerals ¹		Botanicals		Mind/Body		Manipulative & Body Based	
	%	Users (%)	Non-Users (%)	Users (%)	Non-Users (%)	Users (%)	Non-Users (%)	Users (%)	Non-Users (%)
Age at Enrollment	100%	78.8%	21.2%	22.8%	77.2%	41.4%	58.6%	31.5%	68.5%
35–39	4.8%	3.8%	8.5%	3.0%	5.4%	4.5%	5.1%	4.9%	4.8%
40–49	24.8%	21.3%	37.8%	22.0%	25.6%	24.5%	25.0%	25.8%	24.3%
50–59	39.0%	39.6%	37.2%	43.8%	37.6%	40.9%	37.7%	41.5%	37.9%
60–69	26.0%	29.1%	14.5%	26.2%	25.9%	25.1%	26.5%	23.7%	27.0%
70 ⁺	5.4%	6.3%	2.0%	5.0%	5.5%	4.9%	5.8%	4.0%	6.0%
Race/ethnicity ²		***		***		***		****	
White	84.3%	85.9%	78.8%	82.2%	84.9%	83.0%	85.2%	87.9%	82.6%
Black	8.3%	7.3%	11.6%	9.3%	8.0%	9.8%	7.2%	5.3%	9.7%
Hispanic	4.8%	4.2%	6.8%	5.5%	4.6%	4.5%	5.0%	4.1%	5.1%
Asian	0.7%	0.7%	0.6%	0.7%	0.6%	0.7%	0.6%	0.7%	0.6%
Native American/Other ³	2.0%	1.9%	2.3%	2.3%	1.9%	2.1%	1.9%	2.0%	1.9%
Education		***		***		***		****	
High school, GED, or less	15.4%	14.7%	17.8%	14.8%	15.6%	11.0%	18.5%	12.0%	17.0%
Some college	19.5%	19.2%	20.5%	20.7%	19.1%	18.0%	20.5%	18.7%	19.8%
College Grad	41.1%	41.1%	41.3%	40.7%	41.3%	42.3%	40.3%	41.9%	40.8%
PostGraduate ⁺	24.0%	25.0%	20.4%	23.8%	24.0%	28.7%	20.6%	27.4%	22.4%
Currently Employed		***		ns		ns		****	
No	35.1%	37.5%	26.0%	34.7%	35.2%	34.7%	35.3%	31.8%	36.5%
Yes	64.9%	62.5%	74.0%	65.3%	64.8%	65.3%	64.7%	68.2%	63.5%
Marital Status		***		***		***	19	****	
Never Married	5.3%	5.2%	5.7%	5.4%	5.3%	5.7%	5.1%	5.6%	5.2%
Married/partnered)	75.0%	74.8%	75.8%	72.9%	75.6%	73.7%	75.9%	74.0%	75.5%
Widowed	5.0%	5.4%	3.5%	5.0%	5.0%	5.0%	5.1%	4.7%	5.2%
Divorced/Separated	14.6%	14.5%	14.9%	16.7%	14.0%	15.6%	13.9%	15.7%	14.1%

	Total %	Vitamins/Minerals ¹		Botanicals		Mind/Body		Manipulative & Body Based	
		Users (%)	Non-Users (%)	Users (%)	Non-Users (%)	Users (%)	Non-Users (%)	Users (%)	Non-Users (%)
Annual household income									
Less than \$20,000	4.6%	4.6%	4.8%	5.7%	4.3%	4.4%	4.8%	3.6%	5.1%
\$20,000 to \$49,999	21.0%	21.1%	20.5%	22.7%	20.5%	20.8%	21.1%	18.2%	22.3%
\$50,000 to \$99,999	40.8%	41.0%	40.1%	40.4%	40.9%	41.5%	40.3%	41.0%	40.7%
\$100,000 +	33.6%	33.3%	34.6%	31.3%	34.2%	33.3%	33.8%	37.2%	31.9%
Current region of residence									
West	21.7%	22.7%	17.8%	26.8%	20.2%	23.2%	20.6%	26.7%	19.4%
Midwest	27.1%	26.9%	27.9%	23.6%	28.1%	26.5%	27.5%	26.8%	27.2%
South	32.8%	32.1%	35.0%	32.3%	32.9%	33.2%	32.5%	28.3%	34.8%
Northeast	16.8%	16.8%	16.9%	15.3%	17.2%	15.8%	17.5%	16.9%	16.7%
Puerto Rico	1.7%	1.5%	2.4%	2.1%	1.5%	1.4%	1.9%	1.3%	1.9%

Note:

 $p < .001$,**
 $p < .01$,*
 $p < .05$,+
 $p < .10$ ¹ n=470 missing information on vitamin/mineral intake² Priority given to Hispanic then black³ No info or multiple races but neither Hispanic nor black

Table 2

Clinical characteristics of Sisters Study participants, by CAM use

	Total %	Vitamins/Minerals ¹		Botanicals		Mind/Body		Manipulative & Body Based	
		Users (%)	Non-users%	Users (%)	Non-users%	Users (%)	Non-users%	Users (%)	Non-users%
Body mass index (BMI)		****		****		****		****	
<18.5 kg/m ²	1.1 %	1.2%	0.8%	1.1%	1.1%	1.2%	1.1%	1.0%	1.2%
18.5–24.9 kg/m ²	37.4 %	39.0%	31.4%	38.9%	36.9%	41.1%	34.8%	39.2 %	36.6%
25 – 29.9 kg/m ²	31.8%	32.0%	31.3%	31.7%	31.8%	31.0%	32.4%	32.2 %	31.6%
30+ kg/m ²	29.7 %	27.8%	36.5%	28.2%	30.1%	26.8%	31.8%	27.6%	30.7%
Menopausal Status		****		****		ns		****	
Premenopausal	35.3 %	31.1%	50.9%	32.0%	36.3%	35.3%	35.4%	36.8 %	34.7%
Postmenopausal	64.7%	68.9%	49.1%	68.0%	63.7%	64.7%	64.6%	63.2%	65.3%
HRT: Taken estrogen or progesterone		****		****		ns		****	
No	54.5%	50.4%	69.4%	50.9%	55.6%	54.1%	54.8%	53.2%	55.1%
Yes	45.5%	49.6%	30.6%	49.1%	44.4%	45.9%	45.2%	46.8%	44.9%
OC Use		****		****		****		****	
Never	16.0%	16.3%	14.9%	15.2%	16.2%	15.3%	16.5%	13.3%	17.2%
Ever	84.0%	83.7%	85.1%	84.8%	83.8%	84.7%	83.5%	86.7%	82.8%
Mammography		****		*		ns		****	
Never	1.1%	0.8%	2.0%	0.9%	1.1%	1.1%	1.0%	0.9%	1.1%
Within past 2 years	95.3%	96.1%	92.4%	95.2%	95.4%	95.1%	95.5%	95.8%	95.1%
>2 years ago	3.6%	3.1%	5.6%	3.9%	3.5%	3.8%	3.5%	3.3%	3.8%
Breast cancer genetic testing		ns		ns		ns		****	
No	97.0%	97.0%	96.8%	96.9%	97.0%	97.0%	96.9%	96.5%	97.2%
Yes	3.0%	3.0%	3.2%	3.1%	3.0%	3.0%	3.1%	3.5%	2.8%
Breast cancer chemoprevention		****		ns		*		****	
No	90.4%	89.1%	95.1%	90.5%	90.4%	90.8%	90.2%	91.1%	90.1%
Yes	9.6%	10.9%	4.9%	9.5%	9.6%	9.2%	9.8%	8.9%	9.9%
Number of first degree relatives with breast cancer		*		*		*		+	
One	73.1%	72.8%	74.2%	72.3%	73.4%	73.7%	72.7%	73.3%	73.1%

	Total %	Vitamins/Minerals ^d		Botanicals		Mind/Body		Manipulative & Body Based	
		Users (%)	Non-users%	Users (%)	Non-users%	Users (%)	Non-users%	Users (%)	Non-users%
Two	23.6%	23.9%	22.8%	24.3%	23.4%	23.2%	23.9%	23.7%	23.5%
Three or more	3.2%	3.3%	3.0%	3.4%	3.2%	3.1%	3.4%	3.0%	3.4%
Mother has history of breast cancer									
No	81.4%	81.1%	82.3%	80.5%	81.6%	81.5%	81.2%	80.6%	81.7%
Yes	18.6%	18.9%	17.7%	19.5%	18.4%	18.5%	18.8%	19.4%	18.3%
Number of sisters with breast cancer									
One sister w/BC	89.8%	89.8%	90.0%	89.6%	89.9%	90.2%	89.5%	90.7%	89.4%
Two sisters w/BC	9.0%	9.0%	8.9%	9.1%	8.9%	8.6%	9.2%	8.2%	9.3%
Three or more sisters w/BC	1.2%	1.3%	1.1%	1.4%	1.2%	1.1%	1.3%	1.1%	1.3%
Number of live births									
0 Live Births	18.2%	18.8%	16.1%	20.5%	17.5%	19.3%	17.4%	22.0%	16.5%
1 Live Birth	14.6%	14.3%	15.5%	15.6%	14.3%	14.9%	14.4%	15.1%	14.4%
2 Live Births	37.1%	36.7%	38.7%	35.2%	37.7%	35.9%	38.0%	36.7%	37.3%
3+ Live Births	30.0%	30.1%	29.6%	28.7%	30.4%	29.9%	30.1%	26.2%	31.8%
Ever breastfed									
No	43.1%	43.3%	42.6%	42.6%	43.3%	39.2%	45.9%	41.2%	44.0%
Yes	56.9%	56.7%	57.4%	57.4%	56.7%	60.8%	54.1%	58.8%	56.0%
Family Burden Score									
Lowest tertile (0)	14.6%	15.8%	10.1%	14.8%	14.5%	14.4%	14.7%	14.1%	14.8%
Middle tertile (1)	48.0%	48.6%	45.7%	48.6%	47.8%	48.7%	47.5%	47.5%	48.2%
Highest tertile (2 to 4)	37.4%	35.6%	44.1%	36.6%	37.7%	36.9%	37.8%	38.3%	37.0%
Gail Model Score-Absolute Risk									
Lowest tertile (0.3 to 2.3)	33.4%	29.6%	46.8%	31.9%	33.8%	33.7%	33.1%	33.7%	33.2%
Middle tertile (2.3 to 3.5)	33.3%	34.6%	28.6%	33.9%	33.1%	33.5%	33.1%	33.2%	33.3%
Highest tertile (3.5 to 14.3)	33.3%	35.8%	24.6%	34.3%	33.1%	32.7%	33.8%	33.1%	33.5%
Gail Model Score- Relative Risk									
Lowest tertile (1.6 to 3.0)	28.8%	27.9%	32.1%	29.3%	28.7%	29.0%	28.7%	26.2%	30.0%
Middle tertile (3.0 to 4.6)	37.8%	38.1%	37.0%	36.7%	38.2%	38.3%	37.5%	39.1%	37.3%
Highest tertile (3.5 to 14.3)	33.3%	34.0%	30.9%	34.0%	33.2%	32.7%	33.8%	34.7%	32.7%

	Total	Vitamins/Minerals ^I		Botanicals		Mind/Body		Manipulative & Body Based	
	%	Users (%)	Non-users%	Users (%)	Non-users%	Users (%)	Non-users%	Users (%)	Non-users%
Perceived Stress Scale		***		***		***		**	
Lowest tertile (0)	24.9%	25.7%	22.0%	22.6%	25.5%	23.9%	25.6%	24.1%	25.2%
Middle tertile (1 to 3)	42.5%	43.0%	41.0%	42.5%	42.5%	43.4%	42.0%	43.7%	42.0%
Highest tertile (4 to 16)	32.6%	31.3%	36.9%	34.8%	31.9%	32.8%	32.5%	32.2%	32.8%
Self-perceived health status		***		***		***		**	
Excellent	36.8%	37.2%	35.5%	33.8%	37.6%	37.8%	36.1%	35.5%	37.3%
Very good	37.1%	37.3%	36.5%	37.5%	37.0%	36.9%	37.3%	38.2%	36.6%
Good	19.7%	19.3%	20.6%	21.2%	19.2%	19.0%	20.1%	19.8%	19.6%
Fair	5.4%	5.2%	6.0%	6.2%	5.1%	5.2%	5.5%	5.4%	5.4%
Poor	1.1%	1.0%	1.4%	1.2%	1.0%	1.1%	1.1%	1.1%	1.1%

Note:

*** $p < .001$,** $p < .01$,* $p < .05$,+ $p < .10$ ^I n=470 missing information on vitamin/mineral intake

Table 3

Lifestyle characteristics of Sisters Study participants, by CAM use

	Total	Vitamins/Minerals ^I		Botanicals		Mind/Body		Manipulative & Body Based	
	%	Users (%)	Non-users%	Users (%)	Non-users%	Users (%)	Non-users%	Users (%)	Non-users%
Servings of fruits/veg per week									
<35 Servings Fruit & Veg./Wk	88.4%	87.0%	93.2%	85.7%	89.1%	85.0%	90.8%	85.8%	89.5%
35+ Servings Fruit & Veg./Wk	11.6%	13.0%	6.8%	14.3%	10.9%	15.0%	9.2%	14.2%	10.5%
Total physical activity (sports/exercise and daily activities), MET hours per week									
Lowest tertile (7.2 to 32.8)	33.3%	32.1%	37.7%	30.8%	34.1%	30.6%	35.3%	31.8%	34.0%
Middle tertile (32.8 to 58.3)	33.3%	33.7%	32.1%	32.9%	33.5%	33.7%	33.0%	33.6%	33.2%
Highest tertile (58.3 to 350.3)	33.3%	34.2%	30.1%	36.3%	32.4%	35.7%	31.7%	34.6%	32.8%
Recreational (sports/exercise) physical activity, MET hours per week									
Lowest tertile (0.0 to 4.3)	33.3%	30.1%	45.2%	29.8%	34.4%	27.8%	37.2%	28.2%	35.7%
Middle tertile (4.3 to 15.0)	33.5%	34.5%	30.0%	34.2%	33.3%	34.5%	32.9%	34.3%	33.2%
Highest tertile (15.0 to 342.4)	33.1%	35.5%	24.8%	36.0%	32.3%	37.7%	29.9%	37.4%	31.2%
Total caloric intake per day									
< 1500 kcal	47.0%	46.3%	49.4%	43.0%	48.2%	42.5%	50.3%	44.3%	48.3%
1500–2000 kcal	30.7%	31.3%	28.4%	31.7%	30.4%	32.6%	29.3%	31.9%	30.1%
2000+ kcal	22.3%	22.4%	22.2%	25.4%	21.4%	24.9%	20.4%	23.9%	21.5%
Daily fat intake (% of kcal from fat)									
< 30% of kcal	16.1%	16.4%	15.0%	14.6%	16.5%	15.1%	16.8%	14.3%	16.9%
30–35% of kcal	24.7%	25.2%	23.0%	22.7%	25.3%	24.4%	24.9%	23.7%	25.2%
35–40% of kcal	28.8%	28.5%	29.9%	28.2%	29.0%	29.1%	28.6%	29.1%	28.7%
>40% of kcal	30.4%	29.9%	32.1%	34.5%	29.2%	31.4%	29.6%	32.9%	29.2%
Servings alcohol consumed per day									
Never or former drinker	19.0%	18.8%	19.6%	19.4%	18.9%	20.8%	17.8%	16.1%	20.4%
< .5 drinks/day	54.3%	54.0%	55.6%	53.5%	54.6%	53.9%	54.6%	55.0%	54.1%
.5 to 1.5 drinks/day	20.2%	20.7%	18.8%	20.5%	20.2%	19.8%	20.6%	22.3%	19.3%
> 1.5 drinks/day	6.4%	6.5%	6.0%	6.6%	6.3%	5.5%	7.0%	6.6%	6.3%

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	Total %	Vitamins/Minerals ^J		Botanicals		Mind/Body		Manipulative & Body Based	
		Users (%)	Non-users%	Users (%)	Non-users%	Users (%)	Non-users%	Users (%)	Non-users%
Smoking status	***			***		***		***	
Never smoked	53.9%	53.9%	53.7%	51.8%	54.5%	55.3%	52.8%	53.5%	54.0%
Social smoker	2.3%	2.3%	2.0%	2.3%	2.3%	2.6%	2.1%	2.8%	2.1%
Past smoker	35.7%	36.9%	31.4%	38.2%	35.0%	35.8%	35.7%	37.0%	35.2%
Current smoker	8.1%	6.8%	12.9%	7.6%	8.3%	6.3%	9.4%	6.7%	8.8%

Note:

*** $p < .001$,

** $p < .01$,

* $p < .05$,

+ $p < .10$

^J n=470 missing information on vitamin/mineral intake

Table 4

Use of CAM among Sister Study participants, by familial breast cancer risk

CAM Type	Gail Score	All women	Age-Adjusted Model Familial Breast Cancer Risk Score			Adjusted Model ^f Familial Breast Cancer Risk Score			Adjusted Model ^c Familial Breast Cancer Risk Score		
			Low	Moderate	High	Low	Moderate	High	Low	Moderate	High
Any CAM use	Absolute	49,673		1.03 (1.02, 1.04)	1.02 (1.02, 1.03)		1.02 (1.01, 1.02)	1.01 (1.00, 1.02)		1.01 (1.00, 1.02)	1.01 (1.00, 1.02)
	Relative			1.01 (1.01, 1.02)	1.01 (1.01, 1.02)		1.00 (1.00, 1.01)	1.01 (1.00, 1.01)		1.00 (1.00, 1.01)	1.00 (1.00, 1.01)
Vitamins/minerals	Absolute	49,203	1.0	1.04 (1.02-1.06)	1.04 (1.02-1.06)	1.0	1.01 (0.99-1.03)	1.00 (0.99-1.02)	1.0	1.00 (0.99-1.02)	1.00 (0.99-1.01)
	Relative		1.0	1.04 (1.03-1.05)	1.04 (1.03-1.05)	1.0	1.02 (1.01-1.03)	1.01 (1.00-1.02)	1.0	1.01 (1.00-1.02)	1.01 (1.00-1.02)
Natural products - botanicals	Absolute	49,673	1.0	0.95 (0.91-1.00)	0.99 (0.94-1.04)	1.0	1.00 (0.95-1.05)	1.03 (0.97-1.09)	1.0	0.97 (0.92-1.02)	1.01 (0.96-1.08)
	Relative		1.0	0.95 (0.91-0.99)	1.00 (0.96-1.04)	1.0	0.97 (0.93-1.02)	1.04 (0.99-1.09)	1.0	0.97 (0.93-1.02)	1.03 (0.98-1.08)
Natural products - other	Absolute	49,673	1.0	1.03 (1.01-1.04)	1.01 (0.99-1.03)	1.0	1.00 (0.98-1.01)	1.01 (0.99-1.02)	1.0	1.01 (0.99-1.02)	1.00 (0.99-1.01)
	Relative		1.0	1.00 (0.99-1.02)	1.00 (0.98-1.01)	1.0	1.00 (0.98-1.01)	1.00 (0.99-1.02)	1.0	1.00 (0.99-1.01)	1.00 (0.99-1.01)
Mind-body medicine, any	Absolute	49,673	1.0	1.01 (0.97-1.04)	0.97 (0.94-1.01)	1.0	1.01 (0.98-1.04)	1.00 (0.96-1.04)	1.0	1.00 (0.97-1.04)	0.99 (0.95-1.03)
	Relative		1.0	1.00 (0.98-1.03)	0.98 (0.95-1.00)	1.0	1.01 (0.98-1.04)	1.01 (0.98-1.04)	1.0	1.00 (0.98-1.03)	1.00 (0.97-1.03)
Manipulative and body-based	Absolute	49,673	1.0	1.08 (1.04-1.12)	1.11 (1.06-1.16)	1.0	0.99 (0.95-1.03)	1.00 (0.96-1.05)	1.0	0.98 (0.94-1.03)	1.00 (0.96-1.05)
	Relative		1.0	1.13 (1.10-1.17)	1.15 (1.11-1.19)	1.0	1.01 (0.98-1.05)	1.03 (0.99-1.07)	1.0	1.01 (0.97-1.04)	1.02 (0.98-1.06)

Note:

 $p < .001$,**
 $p < .01$,

^aRelative Risk and 95% Confidence Interval using bottom tertile of Gail Scores as the comparison group.

^b Model adjusted for age at enrollment, race/ethnicity, marital status, education and household income.

5. Model adjusted for age at enrollment, race/ethnicity, marital status, education, current employment, current smoking status, number alcoholic drinks per day, number MET hours per week exercise, and total fruit/vegetable intake.