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Predictors of the use of complementary and alternative medicine (CAM) by women at high risk for breast cancer

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ABSTRACT

Background: Few data exist regarding the use of complementary and alternative medicine (CAM) by unaffected women at high risk of breast cancer.
Methods: Self-reported CAM use by women from multiple-case breast cancer families was obtained by questionnaire. Factors associated with CAM use were assessed using multiple logistic regression.
Results: Of 892 women, 55% ($n = 489$) used CAM, 6% ($n = 53$) specifically to prevent cancer. CAM use was independently associated with tertiary education level (OR 2.56, 95% CI 1.83–3.58, $p < 0.001$), greater physical activity (OR 1.05 per hour of physical activity/week, 95% CI 1.00–1.10, $p = 0.049$), greater anxiety (OR 1.92, 95% CI 1.16–3.16, $p = 0.01$), not currently smoking (OR 0.64, 95% CI 0.42–0.97, $p = 0.037$) and lower perceived BC risk (OR 0.82 per 20 percentage points, 95% CI 0.72–0.94, $p = 0.005$).
Conclusions: The majority of high-risk women use CAM, but mostly for reasons other than cancer prevention. Most predictors of CAM use are consistent with the limited literature for women at high risk for cancer.

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1. Introduction

Women with a strong family history of breast cancer and/or who carry a mutation in a breast cancer predisposition gene, such as *BRCA1* or *BRCA2*, are at substantially increased risk for the disease.[1] Conventional risk management strategies for such women include intensified cancer screening, risk-reducing surgery and chemoprevention.[2] Individuals at high risk of cancer may also seek to reduce their risk in other ways, such as leading a healthy lifestyle and using complementary and alternative therapies (CAM). CAM is defined as therapies that are used in addition to (complementary) or instead of (alternative) standard treatments.[3] These practices generally are not considered standard medical approaches. CAM may include dietary supplements, vitamins, herbal preparations, special teas, acupuncture, massage therapy and meditation, among others. CAM use is prevalent in the general community. Large Australian surveys have demonstrated CAM use in up to 70% of the population.[4,5] CAM use is more common in cancer patients and survivors, with up to 83% of patients in one report using at least one form of CAM.[6]

There has been minimal research to date with respect to lifestyle modification and CAM use in women at high risk for breast cancer. This issue is important for a number of reasons. Firstly, there is clear potential for pharmacological interactions between CAM and chemoprevention medications.[7,8] Secondly, some high-risk women may rely on unproven CAM strategies to manage their cancer risk rather than on proven therapies such as risk-reducing surgery and chemoprevention. Lastly, some forms of CAM, such as antioxidants, may be harmful.[9]

The aim of this study was to determine the prevalence and intent of CAM use in women at high risk for breast cancer due to a strong family history and to identify possible predictors of CAM use. We hypothesised that CAM use would be common and that most CAM use in this cohort would be specifically to prevent cancer.

2. Methods

2.1. Study sample

Participants were female members of multiple-case breast cancer families enrolled in the Kathleen Cuningham Foundation Consortium for Research into Familial Breast Cancer (kConFab) cohort. kConFab is a genetic, biological, epidemiological and clinical resource for research into hereditary breast cancer.[10] Families are recruited after an initial member attends a consultation in one of 16 Family Cancer Clinics in Australia and New Zealand. Eligibility criteria for the families are complex and include a strong family history of breast cancer and/or ovarian cancer, or a documented mutation in *BRCA1* or *BRCA2*. At the time of enrolment, blood is drawn for *BRCA* mutation analysis and epidemiology, and family history questionnaires are completed. Participants can choose to learn or not their *BRCA1* and *BRCA2* gene mutation analysis results when these become available. Cancer events, risk management practices, epidemiological and lifestyle risk factors of participants are updated every three years using a self-report questionnaire.[11] In addition, women in the cohort with no personal history of cancer are asked to participate in a psychosocial study, which collects information on subjective cancer risk perception (using a numerical differential scale ranging from 0 to 100), cancer-specific anxiety (using the Intrusive Thoughts subscale of the Impact of Event Scale[12]), general anxiety and depression (using the Hospital Anxiety and Depression Scale[13]), optimism (using the Life Orientation Test[14]) and social support (using the Duke-UNC Functional Social Support Questionnaire[15]) using self-report questionnaires on a three-yearly basis.[11] All participants provide written informed consent, and the study has ethics approval at all recruitment sites.

To be eligible for the current study, women had to have no history of cancer (except non-melanoma skin cancer), have completed the 6-year follow-up questionnaire which included questions on CAM use, and be a blood relative within a multiple-case family. Women from families with a documented mutation in *BRCA1* or *BRCA2* but who knew themselves not to carry the family-specific mutation (true non-carriers who had received their genetic test result) were excluded.

2.2. CAM data collection

In the self-report follow-up questionnaire at 6 years after entry, participants were asked, 'Have you used any form of Complementary or Alternative Medicine?' If the answer was 'yes', they were then asked which CAMs they used in four broad areas: special diet, vitamins/herbs, physical, and mind/body. Within each of these categories specific therapies were listed, giving a total of 35 specific CAM therapies. This was designed based on similar contemporary questionnaires and categories of CAM use.[6,16] For each positive response, participants were asked to indicate whether or not (yes/no) the CAM was used specifically to prevent cancer.

2.3. Potential predictors

The psychosocial variables tested for association with CAM use were perceived risks of breast and ovarian cancer (possible range 0 'No chance' to 100 'Definitely'), cancer-specific anxiety (possible range 0–35 with higher scores indicating more intrusive thoughts; >20 considered 'clinically significant'), general anxiety (possible range 0–21; <8 considered 'normal', 8–10 'sub-clinical', >10 'clinically significant'), depression (possible range 0–21; <8 considered 'normal', 8–10 'sub-clinical', >10 'clinically significant'), optimism (possible range 0–32 with higher scores indicating more optimism) and social support (possible range 8–40 with higher scores indicating greater satisfaction with social support). Other variables were age at interview (years; <40, 40–49, $\geqslant$50); *BRCA1/2* mutation status, education (tertiary versus other), parity (any live births versus none), place of residence (living in a major city versus other), country of birth (Australia or New Zealand versus other), marital status (married or living as married versus other), number of first-degree relatives with breast or ovarian cancer, smoking history (never smoked versus former smokers versus current smokers), alcohol use (standard drinks per week), exercise (divided into quartiles of physical activity based on reported daily, weekly and monthly exercise), body mass index (BMI) (underweight, nor-

mal, overweight and obese as per World Health Organisation criteria[17]), prophylactic mastectomy, and mammographic screening (number of mammograms over the preceding 3 years).

2.4. Statistical analysis

The proportion of women reporting CAM use was compared for the categories of each explanatory variable using Pearson χ^2-test statistics. Univariate and multivariate logistic regressions were used to explore the association between CAM use and the possible explanatory variables. All associations with CAM use are presented as odds ratios and associated 95% confidence intervals and p-values. For the multivariate analysis, a parsimonious model is presented with only the factors statistically significantly associated with CAM use included. This model was developed using forward and backward selection. All continuous variables were fitted both as categorical and as continuous variables (except optimism and social support which were fitted only as continuous variables). A two-tailed p-value with a level of <0.05 was considered statistically significant. All statistics were calculated using Stata 8.0 (Stata Corporation, 2003).

3. Results

3.1. Participant demographics

Of the 1373 women with no personal history of cancer to whom a 6-year follow-up questionnaire was sent, 1001 (73%) responded; 109 were excluded because they were not at high risk for cancer (female spouses of male participants ($n = 18$), or negative for family mutation and knew their result ($n = 91$)), leaving 892 high-risk women. Participant demographics are summarised in Table 1, and are representative of Australian women as a whole with regard to residence, education level, smoking and BMI. The majority, 63% ($n = 559$), lived in an urban rather than regional or rural area. Approximately half (53%, $n = 471$) had undergone tertiary education or vocational training, and 74% ($n = 662$) were married or in a long-term relationship. Seven percent ($n = 61$) were aware of their BRCA1/2 mutation positive status. One woman of the 892 had elected to use chemoprevention, and 18 were participants in a chemoprevention clinical trial (total 2.1% on chemoprevention).

3.2. Overall CAM use

CAM use was reported by 55% ($n = 489$) of subjects; 6% ($n = 53$) overall or 11% of those using CAM reported use specifically for the purpose of preventing cancer (Fig. 1). Of the 489 women who used CAM, 391 (80%) used more than one CAM and 148 (30%) used more than 4 CAMs (Table 2). One woman reported having used 26 CAMs.

Amongst CAM users, 81% ($n = 396$) used vitamins and minerals (8.2% to prevent cancer); 51% ($n = 249$) used physical therapies (0.8% to prevent cancer); 44% ($n = 215$) used mind/body therapies (1.4% to prevent cancer) and 43% ($n = 209$) used special diet (2.5% to prevent cancer) (Fig. 2). The five most common CAMs used were vitamins/supplements ($n = 266$, 54%), low fat diet ($n = 151$, 31%), massage ($n = 138$, 28%), green tea ($n = 128$, 26%) and omega-3 fatty acid ($n = 101$, 21%). The five most frequently used to prevent cancer were green tea ($n = 19$, 16.2% of all CAM use to prevent cancer), vitamins/supplements ($n = 12$, 10.3%), soy rich diet ($n = 12$, 10.3%), low fat diet ($n = 10$, 8.5%) and omega-3 fatty acid ($n = 8$, 6.8%) (Table 3).

3.3. Predictors of CAM use

Table 4 shows that CAM use was 48% more common (in relative terms) in women having a tertiary education ($p < 0.001$); 42% more common in those in the highest quartile of physical activity (more than 5.5 h per week) compared to women in the lowest quartile (less than one hour per week) ($p < 0.001$), and 18% more common in women aged over 50 compared to women aged under 40 ($p = 0.02$). CAM use was less common in women who were current smokers (compared to women who were past smokers or had never smoked) (OR 0.71, 95% CI 0.51–0.99, $p = 0.04$); less common in those with higher perceived BC risk (OR 0.86 per 20 percentage points of risk, 95% CI 0.75–0.98, $p = 0.022$) and OC risk (OR 0.81 per 20 percentage points of risk, 95% CI 0.71–0.93, $p = 0.003$) and less common in women with higher levels of optimism ($p = 0.01$).

Using multivariate logistic regression, the variables positively associated with CAM use were tertiary education level (OR 2.56, 95% CI 1.83–3.58, $p < 0.001$), greater physical activity (OR 1.05 per hour of physical activity/week, 95% CI 1.00–1.10, $p = 0.049$) and 'clinical' level of anxiety (OR 1.92 compared to 'normal' level, 95% CI 1.16–3.16, $p = 0.01$). The variables negatively associated with CAM use were being a current smoker (OR 0.64, 95% CI 0.42–0.97, $p = 0.037$) and perceived BC risk (OR 0.82 per 20 percentage points of perceived risk, 95% CI 0.72–0.94, $p = 0.005$).

4. Discussion

This study is one of the largest to date undertaken with respect to CAM use in women personally unaffected but at high risk of breast cancer. The results reveal that about half of such women use CAM. This does not appear to be any greater than the documented prevalence of CAM use in the general Australian population[4,5], and is similar to the prevalence of 42% seen in a US study in high-risk unaffected women enrolled in a genetic testing programme[18] and to the 51% using at least one dietary supplement in a Canadian study of high-risk women in a genetic testing programme.[19] That vitamins and mineral supplements were the most common form of CAM used is also similar to the previous studies of survivors[16] and those at high risk for cancer.[18] The common use of multiple CAMs is also consistent with a recently published study of CAM use in *BRCA* mutation positive women.[20]

The finding that only a minority of women (6%) were using CAM specifically to try and prevent cancer was unexpected and differs from the previous studies. A study of 243 unaffected high-risk women and cancer survivors specifically asked respondents about complementary therapies used to prevent cancer, and found that 58% of the unaffected women used CAM for cancer prevention one year after genetic

Table 1 – Participant demographics.

Characteristic	Number *n* (%)
Age (years)	
Mean	45.5 years (range: 21–88 years)
<30	102 (12%)
30–39	233 (26%)
40–49	231 (26%)
50–59	180 (20%)
60+	146 (16%)
Birthplace	
Australia or New Zealand	851 (95%)
Other	41 (5%)
Residence	
major city	559 (63%)
not major city	305 (34%)
unable to classify	28 (3%)
BRCA1/2 mutation status	
Positive and aware of result	61 (7%)
Uninformative and aware of result	40 (4%)
Unaware of result	791 (89%)
Educational level	
tertiary/vocational	471 (53%)
other	417 (47%)
Unknown	4 (<1%)
Smoking	
never	483 (54%)
former	230 (26%)
current	179 (20%)
Marital status	
married/de facto	662 (74%)
single	217 (24%)
Unknown	13 (2%)
Parity (no. live births)	
0	141 (16%)
⩾1	751 (84%)
Prophylactic mastectomy	
Yes	27 (3%)
No	865 (97%)
Number of mammograms in last 3 years	
0	228 (25%)
1	1 (<1%)
2	175 (20%)
3	158 (18%)
⩾4	302 (34%)
Unknown	28 (3%)
Body mass index	
<18.5 (underweight)	20 (2%)
18.5–24.99 (normal weight)	391 (44%)
25–29.9 (overweight)	262 (29%)
⩾30.0 (obese)	212 (24%)
Unknown	7 (1%)
Family history of BC (no. 1st degree relatives with breast cancer)	
<2	639 (72%)
⩾2	253 (28%)
Family history of OC (no. 1st degree relatives with ovarian cancer)	
0	796 (89%)
⩾1	96 (11%)
Chemoprevention	
Using off trial	1 (0.1%)
Using on clinical trial	18 (2%)
Not using	873 (98%)

Pt = participant; no. = number; BC = breast cancer; OC = ovarian cancer.

testing.[21] A separate study of similar women found that 43% of the 171 respondents used dietary and other alternative methods to 'prevent' breast cancer.[22] A more recent publication of unaffected women at varying levels of risk showed that half used at least one CAM to prevent breast cancer.[23] In cancer survivors, CAM use specifically to prevent cancer is also similarly prevalent.[6,16,24]

Without qualitative data, it is not possible to determine why the use of CAM specifically to prevent cancer was lower in our study. Importantly, the women in this study are similar to other studies in terms of at-risk disease (breast/ovarian cancer), age and education. Differences in the assessment tool may explain some of the discrepancy between studies. Other studies[18,21] used a single question that focussed on CAM use to prevent cancer, whereas our questionnaire contained a lead-in question asking if participants had used CAM at all and then, if affirmative, a second question asking if they had specifically used it to prevent cancer. Alternatively, it is an Australiasian study whereas prior studies have been largely from the United States, so geographic differences may explain the discrepancies, but this seems unlikely given the similar prevalence of CAM use in the general and cancer-survivor populations between the countries. It would have been particularly interesting to compare the women in our cohort, who used CAM specifically to prevent cancer with other CAM users; however, as there were only 53 of the former this was too small a number for any statistically meaningful comparison.

The association between CAM and higher education level has been consistently seen in the literature.[18,23,25] Increased physical activity has also been associated with CAM use in general population,[26] and with dietary supplement use in high-risk women.[19] Being a non-smoker or former smoker has been associated with CAM use in previous reports.[19,26,27] This suggests that women who use CAM may be motivated to be proactive regarding their own health: exercising and quitting or never smoking. It is important to acknowledge the overall health benefits of some forms of CAM; in particular some dietary interventions which may help to reduce cancer incidence. Most contemporary studies have explored dietary as well as other forms of CAM,[6,21,27] so we included all categories of CAM in our analysis for completeness.

Greater levels of anxiety or depression and higher perceived cancer risk have often, albeit inconsistently, been associated with CAM use in cancer survivors.[19,28,29] While a 'clinical' level of general anxiety was significantly associated with CAM use in our study, interestingly cancer-specific anxiety was not associated, and higher perceived breast cancer risk was in fact negatively associated with CAM use. The DiGianni study of similar high-risk women enrolled in a genetic testing programme[21] also found that CAM use was positively associated with general anxiety and inversely related to breast cancer risk perception. The authors' postulation was that women with higher cancer risk perception may be less willing to 'experiment' on their health with CAM strategies.

Other factors that were crudely associated with CAM use (perceived ovarian cancer risk, age at interview and optimism) were not independently associated once other factors were accounted for, suggesting that their association with CAM use was confounded with other variables. Younger age,

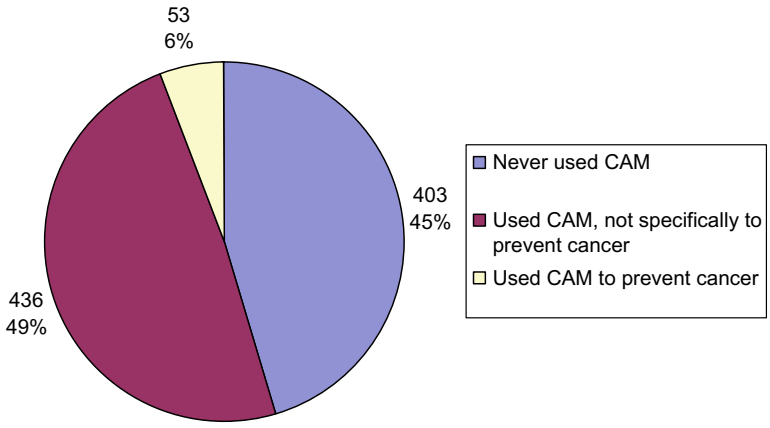

Fig. 1 – CAM use in unaffected high-risk women.

Table 2 – Number of complementary/alternative medicines used.

Number of CAMs used	Number of users	%
1	98	20.0
2	98	20.0
3	82	16.8
4	63	12.9
5	43	8.8
6	34	7.0
7	24	4.9
8	9	1.8
9	10	2.0
10	7	1.4
11	7	1.4
12	7	1.4
⩾13	7	1.4

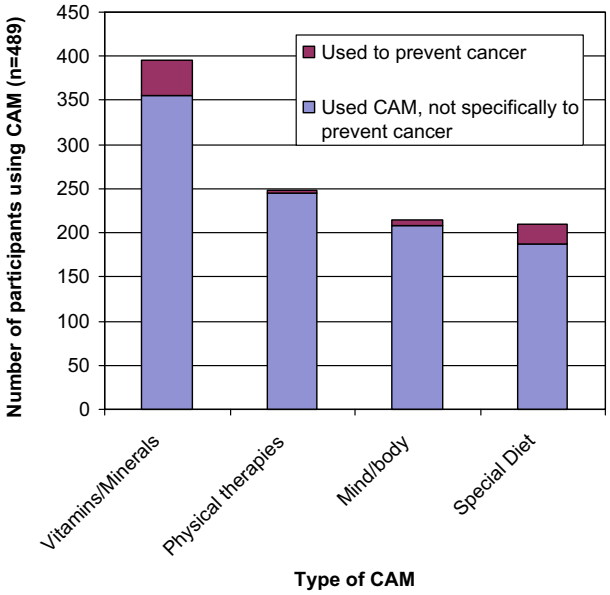

Fig. 2 – Categories of CAM use.

living in an urban area versus regional area or knowing mutation positive status, while having been associated with CAM use in previously published studies,[6,16,21,25,27] was not predictive in this cohort. Also, no association was seen with number of mammograms undertaken or prophylactic mastectomy, in contrast to Myers et al.'s recent publication of unaffected women which found a correlation between CAM use and breast screening behaviours.[23] In the studies of DiGianni et al., interestingly there was an inverse relationship between number of clinical breast examinations undertaken and number of CAMs used at one year.[21] An inverse association between frequency of breast self-examination and CAM use was also seen in a more recent study of women at high genetic risk, although this study found no association between CAM and mammographic screening frequency.[30]

An important aspect of CAM use is the potential for interactions between some forms of CAM and chemoprevention medications such as tamoxifen. Co-enzyme Q10 is structurally related to vitamin K and possesses some procoagulant effects[31]; hence its use with tamoxifen which is associated in rare circumstances with deep vein thrombosis (DVT) should be approached with caution. CAMs such as saw palmetto which inhibit CYP2D6, the enzyme that metabolises tamoxifen to its active metabolites, may result in decreased efficacy of tamoxifen. St John's wort is well known to be a CYP3A4 inducer,[32] and may in theory reduce tamoxifen efficacy. A questionnaire of 233 breast cancer patients in Sweden found that 18.2% were using CAM, including soy, garlic, gingko, Echinacea, ginseng, valerian and phytoestrogens, all of which could potentially interact with tamoxifen or increase risk of breast cancer according to the authors.[7] Only 19 women (2.1%) were using chemoprevention. The numbers of women using chemoprevention, however, may increase in the future with emerging awareness of its efficacy. As such our study finding that 55% of high-risk women used CAM highlights the importance of directly asking about CAM use in women considering chemoprevention.

The strengths of this study include the prospective nature of the cohort, the multi-institutional recruitment of families, the relatively high response rate to the questionnaire (70%) and the large sample size. A limitation of the study is that the questionnaire did not specifically ask when the CAMs were used, so the timing with respect to some of the more dynamic predictors of use (e.g. depression and anxiety) is

Table 3 – Individual CAM use.

CAM type	Overall use *n* (% of all users)	Use to prevent cancer *n* (% of all use to prevent cancer)
Vitamins/minerals		
Co-enzyme Q10	27 (5.5)	1 (0.9)
Flaxseed	49 (10.0)	5 (4.3)
Green tea	128 (26.2)	19 (16.2)
Herbal Rx for menopause	49 (10.0)	4 (3.4)
Other herbal therapy	38 (7.8)	3 (2.6)
Homeopathy	28 (5.7)	1 (0.9)
Melatonin	8 (1.6)	2 (1.7)
Minerals	42 (8.0)	3 (2.6)
Mistletoe	2 (0.4)	0
Omega-3 fatty acid	101 (20.7)	8 (6.8)
Saw Palmetto	0	0
Selenium	19 (3.9)	6 (5.1)
Shark cartilage	42 (8.6)	1 (0.9)
Soy	51 (10.4)	6 (5.1)
Vitamins/supplements	266 (54.4)	12 (10.3)
Other vitamins/herbs	52 (10.6)	6 (5.1)
Physical therapies		
Acupuncture	67 (13.7)	0
Massage therapy	138 (28.2)	1 (0.9)
Reflexology	18 (36.8)	0
Tai Chi/Chi gong	30 (6.1)	0
Yoga	87 (17.8)	2 (1.7)
Other physical	40 (8.2)	1 (0.9)
Mind/body		
Biofeedback/energy healing	5 (1.0)	0
Counsellor/psychologist	62 (12.7)	1 (0.9)
Dietician	30 (6.1)	0
Imagery/visualisation	14 (2.9)	1 (0.9)
Meditation	37 (7.6)	0
Naturopath/herbalist	60 (12.3)	2 (1.7)
Osteopath	34 (7.0)	0
Prayer/spiritual practices	81 (16.6)	3 (2.6)
Reiki	15 (3.3)	1 (0.9)
Traditional Chinese medicine	13 (2.7)	1 (0.9)
Other mind/body	12 (2.5)	0
Special diet		
Low fat diet	151 (3.1)	10 (8.5)
Macrobiotic	6 (1.2)	1 (0.9)
Soy rich diet	34 (7.0)	12 (10.3)
Vegan	3 (0.6)	0
Vegetarian	36 (7.4)	2 (1.7)
Other	21 (4.3)	2 (1.7)

uncertain. Our study compared CAM users with CAM non-users, but did not include a control group of women at average cancer risk within the same families. Data from such a control group were available (female spouses of participants and women who tested negative for a family mutation in *BRCA1* or *BRCA2*), but it was not analysed due to small numbers ($n = 109$). Although we did not formally assess socioeconomic status as a predictor, we did assess education level which is often used as a proxy. Women in our cohort may represent a highly motivated group, more likely to participate in perceived health-protective behaviour than other high-risk women. If so our results may be biased and overestimate the true prevalence of CAM use in such women. Alternatively, women who participated in this research cohort may be more interested in mainstream medical approaches and less likely to use CAM, resulting in an underestimate of the true prevalence.

In one of the largest surveys of CAM use in high-risk women to date, we have largely demonstrated concordance with other published data regarding common types of CAM (vitamins and minerals), and predictors for CAM use (tertiary education, not smoking, higher exercise levels, anxiety and lower perceived breast cancer risk). Surprisingly, the majority of CAM use in these women is not for perceived benefits in reducing cancer risk. Given that the use of CAM in high-risk subjects exceeds 50%, and the potential for drug interactions especially if patients are offered chemoprevention, it is crucial for treating physicians to document and explore patterns of CAM use in these high-risk populations.

Table 4 – Predictors of CAM use.

Predictor	CAM use *n* (%)[a]	Univariate analysis			Multivariate analysis		
		OR	95% CI	*p*-Value	OR	95% CI	*p*-Value
Educational level							
Other	183 (43.9%)	1.0	(Ref)		1.0	(Ref)	
Tertiary/vocational	305 (64.8%)	2.35	1.79–3.08	<0.0001	2.56	1.83–3.58	<0.001
Physical activity (h/wk)		1.05 per hr	1.01–1.09	<0.001	1.05 per hr	1.00–1.10	0.049
<1 (quartile 1)	98 (42.6%)	1.0	(Ref)				
1–2.7 (quartile 2)	141 (58.3%)	1.88	1.30–2.71	0.001			
2.8–5.4 (quartile 3)	116 (58.3%)	1.88	1.28–2.76	0.001			
>5.5 (quartile 4)	134 (60.6%)	2.07	1.42–3.02	<0.001			
Smoking							
Never	268 (55.5%)	1.0	(Ref)				
Former	135 (58.7%)	1.14	0.83–1.57	0.4			
Current	86 (48.0%)	0.74	0.53–1.05	0.09			
Never or former	403 (56.5%)	1.0	(Ref)		1.0	(Ref)	
Current	86 (48.0%)	0.71	0.51–0.99	0.04	0.64	0.42–0.97	0.037
Perceived BC risk		0.86 per 20 points	0.75–0.98	0.022	0.82 per 20 points	0.72–0.94	0.005
0–19	40 (70.2%)	1.0	(Ref)				
20–39	61 (62.9%)	0.72	0.36–1.45	0.36			
40–59	95 (50.5%)	0.43	0.23–0.82	0.01			
60–79	67 (50.0%)	0.43	0.22–0.82	0.01			
80–100	74 (53.6%)	0.49	0.25–0.95	0.04			
General anxiety		1.02	0.98–1.06	0.3			
Normal	225 (53.5%)	1.0	(Ref)		1.0	(Ref)	
Sub-clinical	72 (57.1%)	1.16	0.77–1.73	0.5	1.38	0.90–2.13	0.14
Clinical	60 (63.2%)	1.49	0.94–2.35	0.09	1.92	1.16–3.16	0.01
Perceived OC risk		0.81 per 20 points	0.71–0.93	0.003			
0–19	140 (63.9%)	1.0	(Ref)				
20–39	93 (53.5%)	0.65	0.43–0.97	0.04			
40–59	82 (50.9%)	0.59	0.39–0.89	0.01			
60–79	29 (50.9%)	0.58	0.32–1.05	0.07			
80–100	11 (42.3%)	0.41	0.18–0.94	0.04			
Age at interview		1.01 per yr	1.00–1.02	0.15			
<40	173 (51.6%)	1.0	(Ref)				
40–49	118 (51.1%)	0.98	0.70–1.4				
50+	198 (60.7%)	1.48	1.06–1.97	0.02			
Optimism		1.04 per unit	1.01–1.07	0.01			
Marital status							
Married/de facto	362 (54.7%)	1.0	(Ref)				
Other	120 (55.3%)	1.03	0.75–1.40	0.87			
Parity							
Non-parous	87 (61.7%)	1.0	(Ref)				
Parous	402 (53.5%)	0.71	0.49–1.04	0.07			

(*continued on next page*)

Table 4 – continued

Predictor	CAM use *n* (%)[a]	Univariate analysis			Multivariate analysis		
		OR	95% CI	*p*-Value	OR	95% CI	*p*-Value
Place of birth							
Australia or New Zealand	466 (54.8%)	1.0	(Ref)				
Other	23 (56.1%)	1.05	0.56–1.98	0.87			
Prophylactic mastectomy							
No	476 (55.0%)	1.0	(Ref)				
Yes	13 (48.2%)	0.76	0.35–1.63	0.48			
Number of mammograms in last 3 years		0.98 per mammogram	0.95–1.03	0.49			
None	117 (51.3%)	1.0	(Ref)				
Any	372 (53.7%)	1.21	0.90–1.64	0.21			
Mutation status (+ve or uninformative and aware)							
No	418 (54.4%)	1.0	(Ref)				
Yes	57 (56.4%)	1.08	0.71–1.65	0.70			
Residence							
Not major city	162 (53.1%)	1.0	(Ref)				
Major city	305 (54.5%)	1.06	0.80–1.40	0.68			
Family history							
$\leqslant$1 1st deg rel with BC	343 (53.7%)	1.0	(Ref)				
$\geqslant$2 1st deg rels with BC	146 (57.7%)	1.17	0.88–1.58	0.23			
$\leqslant$1 1st deg rel with OC	436 (54.7%)	1.0	(Ref)				
$\geqslant$2 1st deg rels with OC	53 (55.1%)	1.01	0.66–1.56	0.94			
Alcohol use (no. standard drinks /week)		1.0 per drink	0.98–1.02	0.95			
None	216 (52.1%)	1.0	(Ref)				
Any	273 (57.2%)	1.23	0.95–1.61	0.12			
Body mass index		0.98 per unit	0.96–1.01	0.15			
Underweight or normal	236 (57.4%)	1.0	(Ref)				
Overweight	138 (52.7%)	0.83	0.60–1.13	0.2			
Obese	110 (51.9%)	0.80	0.57–1.12	0.2			
Cancer-specific anxiety		0.99 per unit	0.97–1.02	0.7			
Not clinically significant	340 (56.3%)	1.0	(Ref)				
Clinically significant	17 (46.0%)	0.66	0.34–1.28	0.2			
Depression		0.91 per unit	0.65–1.26	0.56			
Normal	315 (55.9%)	1.0	(Ref)				
Sub-clinical	29 (59.2%)	1.14	0.63–2.07	0.7			
Clinical	13 (46.4%)	0.69	0.32–1.47	0.3			
Social support		1.00 per unit	0.98–1.02	0.85			

ANZ = Australia and New Zealand; BC = breast cancer; OC = ovarian cancer; ref = reference category for measure of association; h/wk = hours per week; no. = number; deg rel = degree relatives.
a May not add to 489 due to missing data.

Conflict of interest statement

None declared.

Ethics statement

The work has been approved by the appropriate ethical committees related to the institutions in which it was performed, and participants have given informed consent to the work.

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