

# Dietary supplement use by individuals living with and beyond breast, prostate, and colorectal cancer: A cross-sectional survey

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**BACKGROUND:** Dietary supplements (DSs) are not recommended for the prevention of cancer recurrence. Although DS use is common in individuals living with and beyond cancer, its associations with beliefs about reduced cancer recurrence risk and demographic and health behaviors are unclear. **METHODS:** Adults (18 years old or older) who had been diagnosed with breast, prostate, or colorectal cancer were recruited through National Health Service sites in Essex and London. Participants completed a mailed survey and telephone or online 24-hour dietary recalls (MyFood24). Supplement use was collected during the dietary recalls. Associations between DS use and demographics, health behaviors, and beliefs about DSs and cancer were explored. **RESULTS:** Nineteen percent of 1049 individuals believed that DSs were important for the reduction of cancer recurrence risk, and 40% of individuals reported DS use. DS use was positively associated with being female (odds ratio [OR], 2.48; confidence interval [CI], 1.72-3.56), meeting 5-a-day fruit and vegetable recommendations (OR, 1.36; CI, 1.02-1.82), and believing that DSs were important for reducing cancer recurrence risk (OR, 3.13; CI, 2.35-4.18). DS use was negatively associated with having obesity (OR, 0.58; CI, 0.38-0.87). The most commonly taken DSs overall were fish oils (taken by 13%). Calcium with or without vitamin D was the most common DS taken by individuals with breast cancer (15%). **CONCLUSIONS:** DS use by individuals living with and beyond cancer is associated with demographic factors and health behaviors. A belief that DSs reduce the risk of cancer recurrence is common and positively associated with DS use. There is a need for health care professionals to provide advice about DS use and cancer recurrence risk. *Cancer* 2021;0:1-8. © 2021 The Authors. *Cancer* published by Wiley Periodicals LLC on behalf of American Cancer Society. This is an open access article under the terms of the Creative Commons Attribution License, which permits use, distribution and reproduction in any medium, provided the original work is properly cited.

**KEYWORDS:** cancer, cancer survivor, diet, supplements.

## INTRODUCTION

Improvements in cancer diagnosis and treatment mean that the number of individuals living with and beyond cancer (LWBC) is increasing globally. An estimated 21 million people are projected to receive a cancer diagnosis annually by 2030.<sup>1</sup> Survival rates vary by cancer site and geographical location but are as high as 90% after a breast cancer diagnosis in the United States and Australia<sup>1</sup>; this highlights the increasing need to meet the health demands of long-term cancer survivors.

Although the evidence for reducing cancer risk in those LWBC is limited, the World Cancer Research Fund and the American Institute for Cancer Research recommend following diet, nutrition, and physical activity recommendations for primary cancer prevention.<sup>2</sup> These guidelines specifically state that dietary supplements (DSs) are not recommended for cancer prevention<sup>2</sup> because randomized controlled trials have generally shown no benefit, and in some cases, unexpected adverse effects have been found.<sup>3</sup>

DSs can play an important role in ensuring adequate nutrient intake when diets are deficient, which is more common in individuals LWBC than others. However, in the US National Health and Nutrition Examination Survey (NHANES), high levels of supplementation were associated with a higher proportion of cancer survivors having intakes of calcium and certain other micronutrients above the tolerable upper intake level.<sup>4</sup> There is also the potential for DSs to compromise treatment efficiency<sup>4,5</sup> or interact with medications.<sup>6</sup> Individuals LWBC may be taking medications not just to treat cancer and manage side effects but also for comorbidities. Although DS use is unlikely to present a risk or benefit for most

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We thank Cancer Research UK for funding, the National Health Service trusts for help with recruiting participants, and the participants for taking the time to complete the measures.

Additional supporting information may be found in the online version of this article.

**DOI:** 10.1002/cncr.34055, **Received:** August 26, 2021; **Revised:** November 8, 2021; **Accepted:** November 16, 2021, **Published online** Month 00, 2021 in Wiley Online Library (wileyonlinelibrary.com)

individuals LWBC, there is the potential for inappropriate DS use because half of those taking supplements do so without consulting health care providers.<sup>4</sup>

Despite an absence of recommendations or evidence of benefits, DS use has been widely reported by those LWBC, and DS use has been found to increase after a cancer diagnosis.<sup>7</sup> As many as 73% of individuals LWBC reported DS use in one US study,<sup>8</sup> and although other studies of those LWBC have reported lower intakes, they are still generally higher in comparison with cancer-free individuals<sup>4,9</sup> (eg, 33% vs 21% in a Korean-based study<sup>9</sup>). The reasons for taking supplements are not fully understood, but a quarter of DS users LWBC report doing so to treat cancer<sup>6</sup> or prevent cancer recurrence.<sup>10</sup> Supplement users LWBC have also reported DS use as “something they could do to help themselves” and to boost their immune systems and gain energy.<sup>11</sup> The most common reasons given by just under 2000 supplement users LWBC in NHANES were to improve overall health and to maintain health. However, because this questionnaire was for all participants, the majority of whom were cancer-free, it did not include options related to cancer recurrence.<sup>4</sup> It is unclear whether beliefs about DSs playing a role in cancer recurrence are widespread among individuals LWBC and if such beliefs are associated with demographic factors and DS use. The aims of the current study were to identify and classify supplements taken by breast, prostate, and colorectal cancer survivors and to explore factors associated with their use, including body mass index (BMI), diet quality, and beliefs about the role of supplements in reducing the risks of cancer recurrence.

## MATERIALS AND METHODS

A cross-sectional study using baseline data from the Advancing Survival Cancer Outcomes Trial (ASCOT)<sup>12</sup> was performed. Ten hospital sites across London and Essex sent a survey to patients 18 years old or older who had been diagnosed with breast, prostate, or colorectal cancer between 2012 and 2015. Respondents were asked to provide contact details if they were interested in learning more about a trial of a lifestyle intervention. Those expressing interest, meeting eligibility criteria, and providing informed consent were asked to complete additional baseline assessments, including two 24-hour dietary recalls. Participants were not required to complete all baseline assessments for randomization, so some participants did not complete the recalls. In the current analysis, we included eligible participants randomized within the trial

(between August 2015 and November 2017) who completed the first 24-hour dietary recall requested. (ASCOT was conducted in 2 phases with additional participants recruited in 2019 when a 2-year follow-up assessment was added to the trial; 1151 participants were randomized in the first phase, with 102 not completing the first 24-hour dietary recall.) Ethical approval was obtained through the National Research Ethics Service Committee South Central–Oxford B (reference number 14/SC/1369). Described next are the measures included in the current analysis.

## Survey

The survey included questions to assess the following: age (in years), gender (male or female), ethnicity (White or non-White), marital status (married/cohabiting or separated/divorced/widowed/single), highest level of education (no formal qualifications, General Certificate of Secondary Education/vocational or equivalent, A-level or equivalent, or bachelor’s degree and higher or equivalent), number of different types of cancer treatments (including surgery, chemotherapy, and radiotherapy) for the most recent cancer, and cancer type (breast, prostate, or colorectal cancer). Although participants were asked to report their cancer stage, a very large proportion did not know, so cancer spread, assessed with “Has this cancer spread to any other parts of your body?,” was used. For the cancer spread variable, the response option “don’t know” was recoded as missing data. The survey assessed the number of comorbid conditions by asking participants if they had any health problems from a list of 15 supplied health problems or other health problems not listed. Responses were categorized as none, 1, 2, or  $\geq 3$ . BMI scores were calculated with self-reported height and weight and were categorized as underweight/healthy weight ( $<25 \text{ kg/m}^2$ ), overweight ( $\geq 25$  and  $<30 \text{ kg/m}^2$ ), or obese ( $\geq 30 \text{ kg/m}^2$ ).<sup>13</sup> The underweight and healthy weight categories were combined because less than 1% of the participants fell into the underweight category ( $\text{BMI} < 18.5 \text{ kg/m}^2$ ).

Participants were also asked for their thoughts about lifestyle and cancer. This included the following question: “Please rate how important each of the following are to you in reducing the chance that your cancer will come back (recur).” The question was followed by a list of different factors, including “taking dietary supplements (eg, vitamins).” Responses were collected via a Likert scale, with 1 indicating “not at all important” and 5 indicating “very important.” Responses were dichotomized as “not important” (1-2) and “important” (3-5).

### 24-Hour Dietary Recalls

Two 24-hour dietary recalls could be completed online or by telephone with the myfood24 program<sup>14</sup>: one on a weekday and the other on a weekend day. A weighted average daily intake was calculated ( $[5 \times \text{weekday intake} + 2 \times \text{weekend day intake}]/7$ ). If 2 days' information was collected but this was not for a weekday and a weekend day, then the mean intake was calculated, and if only a single 24-hour recall was completed, this information was used. For this article, dietary information from the 24-hour recalls was used to assess adherence to the World Cancer Research Fund and UK dietary recommendations for fiber<sup>15</sup> ( $\geq 30$  g of fiber [AOAC] per day), fruits and vegetables<sup>2</sup> ( $\geq 5$  portions [400 g] per day), red meat<sup>2</sup> ( $< 500$  g per week), processed meat<sup>2</sup> (none consumed), and minimal intake of high-calorie foods<sup>2,15,16</sup> ( $< 33\%$  of calories from fat and  $< 5\%$  of calories from free sugars per day).

At the end of the first 24-hour dietary recall, participants were asked, "Did you take any vitamins, minerals or other supplements during your day?" Fields labeled "dose," "type," and "brand" were completed. DSs recorded at the end of the first 24-hour recall were included in the analysis if they met the definition used in European Union law for DS data.<sup>17</sup> This included vitamins, minerals, amino acids, enzymes, and herbal extracts in capsule or liquid form. Other items recorded by participants in the space for DSs (eg, medications or laxatives) were excluded.

### Analysis

For the data analysis, the Statistical Package for the Social Sciences (version 25) was used. *t* tests and  $\chi^2$  tests were used to compare demographic data, clinical characteristics, beliefs about supplements, and dietary factors between DS users and nonusers.

Multiple imputation was used to reduce the possible bias of missing data,<sup>18</sup> with all the variables planned to be included in the regression analyses included. Logistic regression analyses were conducted on the imputed data set to explore factors associated with DS use. DS use was the dependent variable, and other variables listed in Table 1 were included as independent variables. However, "cancer type" was excluded to avoid the problem of multicollinearity because "cancer type" and "gender" were identical in the breast cancer sample (all female) and the prostate cancer sample (all male). First, a series of regressions was run for each of the independent variables individually, with no covariates included in each model. Then, 1 regression including all independent variables and controlling for

covariates was run. The logistic regression analyses were repeated with completers to confirm if the pattern of results was similar.

### RESULTS

A total of 5835 questionnaires were completed; 1151 participants were randomized as they expressed an interest in the trial, were eligible, and completed any baseline measurements. The first baseline 24-hour recall was completed by 1049 participants, so data from these participants were included in the current analysis. The majority of the participants completed 2 recalls, but 7 participants completed only 1. A missing value analysis found that 2.96% of 17,833 values were missing, and 35.18% of the 1049 cases had at least 1 piece of missing data.

Participants were predominantly White (94%) and female (62%) with a mean age of 64 years. Forty percent of individuals LWBC reported DS use, and 32% of DS users believed that supplements (eg, vitamins) were important for reducing cancer recurrence risk (Table 1).

DSs containing fish oils were taken most frequently (Table 2). Calcium supplements and those containing calcium with vitamin D were grouped together (calcium with or without vitamin D) because some participants reported a brand name producing both. DSs marketed for joint health, including glucosamine and chondroitin, were classified as joint supplements. Turmeric and garlic were the most commonly used plant-based supplements; those taken less frequently, including pomegranate and kelp, were grouped as "other herbal supplements." Likewise, vitamins C, D, and B complex were shown separately, and less frequently taken vitamins were shown as "other vitamins." Supplements not falling into any other category, such as coenzyme Q10 and probiotics, were listed as "other supplements." Two participants reported taking supplements but did not provide details. DS users took on average 1.8 different supplements. Forty percent of DS users took more than 1 supplement, and 9.8% took more than 3 supplements (range, 4-15). The most frequently reported DSs were fish oils, which were followed by calcium with or without vitamin D, multivitamins and minerals, vitamin D, and herbal supplements. Table 3 shows unadjusted and adjusted results from the binary logistic regression analyses with the imputed data set. When we adjusted for covariance, being female, believing that supplement use was important to recurrence, and not having obesity remained significant predictors of DS use. Repeating this analysis only with completers showed the same

**TABLE 1.** Demographic Data, Clinical Characteristics, Dietary Factors, and Dietary Supplement Beliefs and Use in Breast, Prostate, and Colorectal Cancer Survivors

	Total (n = 1049)	Dietary Supplement Use	
		Yes (n = 420 [40%])	No (n = 629 [60%])
Gender, No. (%)	1049		
Male	398 (37.9)	118 (28.1)	280 (44.5)
Female	651 (62.1)	302 (71.9)	349 (55.5)
Age, mean (SD), y	1046 (64.4)	64.74 (10.97)	64.21 (11.61)
Missing, No. (%)	3 (0.3)		
Cancer type, No. (%)	1049		
Breast	571 (54.4)	267 (63.6)	304 (48.3)
Prostate	264 (25.2)	75 (17.9)	189 (30.0)
Colorectal	214 (20.4)	78 (18.6)	136 (21.6)
Racial group, No. (%)	1044		
White	982 (93.6)	381 (91.4)	601 (95.9)
Non-White	62 (5.9)	36 (8.6)	26 (4.1)
Missing	5 (0.5)		
Highest level of education, No. (%)	983		
No formal qualifications	176 (16.8)	77 (19.3)	99 (17)
GCSE/vocational	326 (31.0)	128 (32.1)	198 (33.9)
A-level	138 (13.2)	52 (13.0)	86 (14.7)
Degree or higher	343 (32.7)	142 (35.6)	201 (34.4)
Missing	66 (6.3)		
Comorbidities, No. (%)	1046		
0	366 (34.9)	130 (31.1)	236 (37.6)
1	347 (33.1)	141 (33.7)	206 (32.8)
2	190 (18.1)	86 (20.6)	104 (16.6)
≥3	143 (13.6)	61 (14.6)	82 (13.1)
Missing	3 (0.3)		
Cancer spread, No. (%)	953		
Yes	17 (1.6)	7 (1.9)	10 (1.7)
No	936 (89.2)	371 (98.1)	565 (98.3)
Don't know/missing	96 (9.2)		
No. of treatments, mean (SD)	1025 (2.12)	2.17 (1.1)	2.09 (1.13)
Missing, No. (%)	24 (2.3)		
BMI, No. (%)	985		
Underweight/healthy weight	370 (35.3)	161 (41.1)	209 (35.2)
Overweight	408 (38.9)	162 (41.3)	246 (41.5)
Obesity	207 (19.7)	69 (17.6)	138 (23.3)
Missing	64 (6.1)		
Perceived importance of supplements for preventing cancer recurrence, No. (%)	928		
Not important	756 (72.1)	258 (67.9)	498 (90.9)
Important	172 (16.4)	122 (32.1)	50 (9.1)
Missing	121 (11.5)		
Fiber recommendation, No. (%)	1049		
Not meeting	937 (89.3)	362 (86.2)	
Meeting	112 (10.7)	58 (13.8)	
Fruit and vegetable recommendation, No. (%)	1049		
Not meeting	558 (53.2)	196 (46.7)	
Meeting	491 (46.8)	224 (53.3)	
Red meat recommendation, No. (%)	1049		
Not meeting	133 (12.7)	50 (11.9)	
Meeting	916 (87.3)	370 (88.1)	
Processed meat recommendation, No. (%)	1049		
Not meeting	526 (50.1)	186 (44.3)	
Meeting	523 (49.9)	234 (55.7)	
High-calorie food recommendation, No. (%)	1049		
Not meeting	1007 (96)	405 (96.4)	
Meeting	42 (4)	15 (3.6)	

Abbreviations: BMI, body mass index; GCSE, General Certificate of Secondary Education.

associations for these factors (see Supporting Table 1). When we considered associations between diet and DS use, unadjusted results showed that adherence to some dietary guidelines (fiber, fruits and vegetables, and

processed meat) was positively associated with DS use. However, after adjustments for covariance, only adherence to fruit and vegetable guidelines was found to be associated with DS use (odds ratio, 1.36). An analysis

**TABLE 2.** Type of Dietary Supplements Taken by Breast, Prostate, and Colorectal Cancer Survivors

Dietary Supplement Type	Total (n = 1049)	Cancer Type, No. (%)		
		Breast (n = 571)	Prostate (n = 264)	Colorectal (n = 214)
Fish oils	137 (13.1)	73 (12.8)	35 (13.3)	29 (13.6)
Calcium ± vitamin D	95 (9.1)	86 (15.1)	5 (1.9)	4 (1.9)
Multivitamins and minerals	87 (8.2)	56 (9.8)	18 (6.8)	13 (6.0)
Vitamin D	81 (7.7)	52 (9.1)	13 (4.9)	16 (7.4)
Joint supplements	61 (5.8)	32 (5.6)	16 (6.1)	13 (6.1)
B vitamins	31 (3.0)	19 (3.3)	4 (1.5)	8 (3.7)
Vitamin C	27 (2.3)	11 (1.9)	6 (2.3)	10 (4.7)
Turmeric	20 (1.9)	10 (1.8)	6 (2.3)	4 (1.9)
Other minerals	18 (1.7)	13 (2.3)	3 (1.1)	2 (0.9)
Garlic	13 (1.2)	6 (1.1)	4 (1.5)	3 (1.4)
Zinc	10 (1.0)	7 (1.2)	2 (0.8)	1 (0.5)
Iron	9 (0.9)	5 (0.9)	2 (0.8)	2 (0.9)
Other herbal supplements	64 (6.1)	45 (7.9)	10 (3.8)	8 (3.7)
Other vitamins	6 (0.6)	4 (0.7)	1 (0.4)	1 (0.5)
Other supplements	51 (4.9)	33 (5.8)	11 (4.2)	7 (3.3)
Not specified	2 (0.2)	2 (0.4)	0	0

with completers showed largely similar results except that adjusting for covariance resulted in adherence to fiber guidelines, but not adherence to fruit and vegetable guidelines, being associated with DS use.

## DISCUSSION

In this study, 40% of individuals with breast, prostate, or colorectal cancer reported DS use, and this was more common among individuals who believed that DSs were important in reducing cancer recurrence risk. Females, those without obesity, and those with higher fruit and vegetable intake were also more likely to report DS use.

The proportion of participants reporting DS use was lower than that reported in other populations LWBC<sup>4,8</sup> and in a systematic review of 32 studies, which found that 64% to 87% of cancer survivors, depending on the cancer site, reported vitamin and mineral supplement use.<sup>7</sup> The lower DS use among ASCOT participants may be partly explained by methodological differences because only supplements taken the day before the 24-hour recall was completed were included in the current analysis, whereas others used surveys and reported DS use in the last month.<sup>4,8</sup> By recording only DS use on the previous day, we may have reduced recall error but missed some intermittent supplement use.

The finding that DS use was associated with being older and having a lower BMI and was more common among women than men is in agreement with other studies of general population samples and individuals LWBC.<sup>8,9,11,19</sup> However, we did not find any association with education, whereas others have generally found a positive association.<sup>7</sup> The finding of a positive association of DS use with fruit and vegetable intake

in our imputed data set (Table 3) but with fiber when only completer data were used (see Supporting Table 1) is a symptom of the covariability between indicators of food and nutrient intake, and both measures could be viewed as interchangeable indicators of healthy diets. Similarly, DS use was associated with higher diet quality scores<sup>20</sup> in a general population sample and with fruit and vegetable intake among individuals receiving breast cancer treatment.<sup>21</sup>

The most common DSs recorded by ASCOT participants were fish oils, which were followed by calcium with or without vitamin D, multivitamins and minerals, and vitamin D. Other studies with cancer survivors also have reported vitamin D, calcium, and multivitamins and minerals being among the most commonly used DSs.<sup>4,8</sup> In the current study and others, calcium/vitamin D supplement use was higher in individuals with breast cancer in comparison with other cancer types.<sup>8</sup> Some women mentioned during phone 24-hour recalls that they had been prescribed a calcium and vitamin D supplement to reduce the osteoporosis risk associated with their cancer medication. Osteoporosis is a known side effect of some breast cancer medications<sup>22</sup> and is more prevalent in older women than other groups; it was reported by 9% of the ASCOT participants. There was no indication that having prostate or colorectal cancer was associated with the use of any specific type of supplement.

Only 8% of our sample took a DS containing individual micronutrients other than calcium or vitamin D, whereas vitamins A, C, E, and B<sub>12</sub>, niacin riboflavin, thiamine, zinc, and magnesium were each taken by more than 40% of the NHANES population.<sup>4</sup> Because the NHANES data were collected between 2003 and 2016,

**TABLE 3.** Logistic Regression Analyses for Dietary Supplement Use in Breast, Prostate, and Colorectal Cancer Survivors (n = 1049)

	Unadjusted			Adjusted <sup>a</sup>		
	OR	CI	P	OR	CI	P
Gender						
Male	1.00	—	—	1.00	—	—
Female	2.05	1.58-2.68	≤.001	2.48	1.72-3.56	≤.001
Age (y)	1.004	0.99-1.02	.467	1.02	1.00-1.03	.046
Ethnicity						
White	1.00	—	—	1.00	—	—
Non-White	2.23	1.32-3.76	.003	1.57	0.89-2.78	.122
Highest level of education						
No formal qualifications	1.00	—	—	1.00	—	—
GCSE/vocational	0.85	0.60-1.23	.39	0.85	0.56-1.31	.464
A-level	0.80	0.51-1.25	.33	0.87	0.52-1.46	.607
Degree or higher	0.92	0.64-1.32	.63	0.83	0.54-1.28	.405
No. of comorbid conditions						
None	1.00	—	—	1.00	—	—
1	1.24	0.92-1.68	.16	1.19	0.85-1.66	.320
2	1.51	1.05-2.15	.03	1.31	0.88-1.95	.189
≥3	1.36	0.92-2.02	.13	1.40	0.88-2.23	.152
Cancer spread						
No	1.00	—	—	1.00	—	—
Yes	0.95	0.42-2.17	.91	0.76	0.32-1.81	.527
No. of treatments	1.07	0.96-1.20	.24	0.90	0.77-1.05	.182
BMI						
Underweight/healthy weight	1.00	—	—	1.00	—	—
Overweight	0.85	0.64-1.13	.25	0.87	0.63-1.20	.398
Obesity	0.65	0.45-0.93	.02	0.58	0.38-0.87	.010
Perceived importance of supplements for preventing cancer recurrence						
Not important	1.00	—	—	1.00	—	—
Important	3.41	2.59-4.50	≤.001	3.13	2.35-4.18	≤.001
Fiber recommendation						
Not meeting	1.00	—	—	1.00	—	—
Meeting	1.71	1.15-2.53	.01	1.45	0.91-2.31	.115
Fruit and vegetable recommendation						
Not meeting	1.00	—	—	1.00	—	—
Meeting	1.55	1.21-1.99	.01	1.36	1.02-1.82	.039
Red meat recommendation						
Not meeting	1.00	—	—	1.00	—	—
Meeting	1.13	0.77-1.64	.54	1.03	0.68-1.56	.894
Processed meat recommendation						
Not meeting	1.00	—	—	1.00	—	—
Meeting	1.48	1.16-1.90	.002	1.22	0.92-1.62	.160
High-calorie food recommendation						
Not meeting	1.00	—	—	1.00	—	—
Meeting	0.83	0.43-1.57	.56	0.71	0.35-1.43	.332

Abbreviations: BMI, body mass index; CI, confidence interval; GCSE, General Certificate of Secondary Education; OR, odds ratio.

<sup>a</sup>Adjusted for age, gender, racial group, highest level of education, BMI, cancer spread, number of treatments, number of comorbid conditions, supplements important for cancer recurrence, and dietary variables (whether meeting recommendations or not).

this may reflect the emergence of advice on the potential cancer-related risks associated with using high doses of individual nutrients, particularly vitamin E.<sup>23</sup> The differing regulations and availability of supplements in the United Kingdom and the United States may also help to explain the dissimilar findings.

Fish oil supplements, including cod liver oil, omega 3s, and docosahexaenoic acid, were the most common DSs among ASCOT participants (13%); this was comparable to cancer survivors in NHANES (15%).<sup>4</sup> However, less than a quarter of NHANES DS users took these,

whereas a third of ASCOT participants did. There is limited evidence suggesting that fish oil supplements may be protective against cancer-related complications<sup>24</sup> and benefit those with arthritis.<sup>25</sup> It was noted that arthritis was the most common comorbidity (reported by 25% of ASCOT participants), and this may be a factor in the popularity of the supplements in this population. It was unclear whether participants were given professional advice regarding the use of DSs for reasons related to their cancer or comorbidities, and this would be useful to explore further.

The finding that 18% of individuals LWBC believed that DSs were important for reducing cancer recurrence risk, which contradicts guidelines,<sup>2</sup> and the positive association with DS use highlight the need for additional advice. Research by Du et al<sup>4</sup> found that only 27% of cancer survivors taking DSs were doing so on advice of a physician, and 46% received no medical advice. It may be that health care professionals require additional training or resources to enable them to provide adequate advice regarding DS use as part of holistic lifestyle advice following cancer. Evidence suggests that both health care professionals and individuals LWBC would be in favor of improving the provision of lifestyle advice.<sup>26,27</sup> Including advice regarding DS use as part of this would reduce the risk of treatment interactions and inappropriate DS use.<sup>3,4</sup> Providing DS advice alongside lifestyle advice for cancer and comorbidities, including evidence-based advice regarding diet, physical activity, smoking, and alcohol use, could ensure that DSs are not seen as being of equivalent benefit.

Strengths of the current study include the prospective recording of diet and DSs. Limitations include the fact that data were self-reported, intermittent supplement use was missed, participants were limited to those with specific cancers, and individual drug/supplement interactions were not studied. Because vitamins were the only example of a supplement provided in the questionnaire, others such as botanicals may have been missed. The population was also predominantly female and of White ethnicity. Furthermore, beliefs about the importance of DSs for reducing cancer recurrence risk were assessed with a single question.

In conclusion, DS use is common among those LWBC, and a large variety of DSs are taken. Factors associated with DS use include those related to demographic, clinical, and dietary variables as well as individuals' beliefs about cancer recurrence. Further research should explore the origins of beliefs related to cancer recurrence and how best to provide appropriate DS advice to individuals LWBC.

## FUNDING SUPPORT

Funding was provided by Cancer Research UK (C43975/A27498 and C1418/A14133).

## CONFLICT OF INTEREST DISCLOSURES

Helen A. Croker reports funding from the World Cancer Research Fund. Rebecca J. Beeken reports funding from Yorkshire Cancer Research. The other authors made no disclosures.

## AUTHOR CONTRIBUTIONS

**Rana E. Conway:** Methodology, supervision, writing—original draft, and writing—review and editing. **Freyja V. Rigler:** Methodology, data analysis, writing—original draft, and writing—review and editing. **Helen A. Croker:**

Methodology and writing—review and editing. **Phillippa J. Lally:** Writing—review and editing. **Rebecca J. Beeken:** Funding acquisition, methodology, and writing—review and editing. **Abi Fisher:** Funding acquisition, methodology, supervision, and writing—review and editing.

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