

# A Population-based Study of Prevalence of Complementary Methods Use by Cancer Survivors

*A Report From the American Cancer Society's Studies of Cancer Survivors*

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**BACKGROUND.** The use of complementary methods (CMs) is widespread and increasing in the United States. Most literature on CM use among cancer survivors focuses on the treatment period, whereas only a few studies address use further along the cancer continuum.

**METHODS.** This study analyzed the prevalence and the medical and demographic associations of CM use among cancer survivors surveyed 10 to 24 months after diagnosis. The study's sample—4139 survivors of 1 of 10 adult cancers—was selected from stratified random samples provided by statewide cancer registries and surveyed by mail and telephone. Three logistic regression models examined associations between medical and demographic factors and CM use among survivors of sex-specific and non-sex-specific cancers.

**RESULTS.** Of the 19 CMs included in the survey, the CMs most frequently reported were prayer/spiritual practice (61.4%), relaxation (44.3%), faith/spiritual healing (42.4%), nutritional supplements/vitamins (40.1%), meditation (15%), religious counseling (11.3%), massage (11.2%), and support groups (9.7%). Among these 19 CMs, the least prevalent were hypnosis (0.4%), biofeedback therapy (1.0%), and acupuncture/acupressure (1.2%). Survivors more likely to use CMs were female, younger, white, higher income, and more educated.

**CONCLUSIONS.** This study provides information regarding prevalence and medical-demographic determinants of CM use reported by a large, population-based sample of survivors of 10 cancers surveyed 10 to 24 months after diagnosis. These findings may be used by clinicians and researchers to inform their decisions regarding which CMs to address in practice and research. *Cancer* 2008;113:1048–57. © 2008 American Cancer Society.

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**B**iological, epidemiological, and social science research methods have been applied with increasing frequency during the past decade to study complementary and alternative medicine or methods (CAMs), the broad range of scientifically unproven treatments and practices that are not presently considered part of conventional medicine. The term “complementary methods” refers to such practices when used along with conventional medical methods, whereas alternative medicine or methods refers to the use of such practices instead of conventional medical therapies. Several studies have pointed toward widespread use of CAMs in the US population overall and specifically in people with a variety of health problems, such

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as cancer.<sup>1-6</sup> The numbers of users appears to be increasing,<sup>7</sup> although an accurate picture of how frequently these methods are used, and by whom, has been emerging only recently.

In 1990, the first survey of CAM use in the general US population found that 34% of adults reported having used at least 1 of 16 CAMs in the past year.<sup>4</sup> An analysis of data from the 2002 National Health Interview Survey (NHIS; N = 31,044), found that when the definition of CAMs included "prayer for health reasons," 62% of US adults reported using at least 1 of 27 CAMs in the past year (36%, if prayer for health reasons was excluded).<sup>2</sup>

Although the use of alternative therapies by cancer patients and survivors is difficult to assess accurately, some studies suggest that a substantial number are using complementary methods (CMs). A 1984 survey reported that 54% of cancer center inpatients used "unorthodox" (CAM) treatments.<sup>6</sup> The 2002 NHIS provides some information about the use of CAMs by cancer survivors in the United States. Forty percent of the 1904 cancer survivors reported CAM use within the past year, and 62% reported using prayer for healing. Controlling for other factors, survivors used CAMs more than the general population (odds ratio [OR], 1.36; 95% confidence interval [CI], 1.20-1.53), but similarly to those with chronic symptomatic illness. Survivors used prayer for healing (PFH) more than the general population (OR, 1.87; 95% CI, 1.66-2.10). The greater use of CAM and PFH was found in both recent and long-term (>10 years) survivors.<sup>5</sup>

The literature on CM use among cancer patients and survivors has been limited in important ways. Although the 2002 NHIS survey is quite valuable in examining CAM use in a very large national sample,<sup>2,8</sup> including cancer survivors, the study relies entirely on self-report rather than cancer registry data for the cancer information. Published studies that included verified medical information have largely used data collected from clinical series of patients being treated at a single center (or, less often, at a few centers).<sup>9-11</sup> Most of these studies are from academic cancer centers,<sup>9,12,13</sup> and therefore seldom provide nationally representative samples. Typically, sample sizes are relatively small and inadequately powered for multivariable analyses of factors associated with patterns of use. Many studies have focused on a single cancer type, primarily breast<sup>14-17</sup> or prostate cancer,<sup>18-20</sup> or a small number of the most common cancer types.<sup>21,22</sup> Most studies involve patients in active treatment,<sup>11,18,20,22-24</sup> although a small number have explored CM use among limited groups of survivors.<sup>5,15,25,26</sup> Although this information

is valuable, little research has explored CM use by survivors of less common cancers or those not treated at major cancer centers.

Population-based information on the prevalence and demographic associations of CM use by cancer survivors can influence clinicians' priorities in informing their patients regarding the benefits and risks of CMs, can help prioritize research investigating the efficacy and safety of CMs, and might guide educational outreach to population segments with low utilization of evidence-based CM interventions. Therefore, using data from the American Cancer Society's Study of Cancer Survivors-I (SCS-I), we analyzed the prevalence and medical and demographic associations of CM use reported by survivors of 1 of 10 cancer types who were surveyed 10 to 24 months after diagnosis.

## MATERIALS AND METHODS

SCS-I is a longitudinal nationwide study of 5901 adult cancer survivors that was designed to explore cancer survivors' physical and psychosocial adjustment after completion of treatment, identify factors affecting their quality of life, and examine late effects. Participants were selected from stratified random samples provided by 11 statewide cancer registries. Overall approval was obtained from the Institutional Review Board of Emory University, with additional approvals obtained for each state. Study eligibility criteria included: 1) age at least 18 years old at diagnosis; 2) diagnosed with 1 of 10 high-incidence cancers (ie, breast, prostate, bladder, uterine, skin melanoma, colorectal, kidney, non-Hodgkin lymphoma [NHL], ovarian, and lung); 3) local, regional, or distant Surveillance, Epidemiology, and End Results summary stage (except inclusion of in situ cases for bladder cancer); 4) diagnosed between January 2000 and September 2003; and 5) fluent in English or Spanish. Younger survivors (<55 years old), racial and ethnic minorities, and survivors of cancers with higher mortality rates (lung, colorectal, kidney, NHL, and ovarian) were over-sampled. The physician consent rate for this study was 93.0%, and the case recruitment rate was 42.1%. A detailed discussion of the study methodology is available elsewhere.<sup>27</sup>

The study survey included questions concerning use of 19 CMs: "Have you used any of the following to help you deal with your cancer?" Analyses were limited to survivors 1) who responded to at least 10 of the 19 CM items, 2) who completed mail surveys 10-24 months after diagnosis, and 3) whose self-reported cancer history corresponded to cancer reg-

istry data. Survivors of local or regional disease who self-reported disease progression or additional primaries were excluded. The final sample analyzed included 4139 cancer survivors: 1019 breast, 814 prostate, 610 colorectal, 362 lung, 270 ovarian, 226 kidney, 215 uterine corpus, 136 bladder, 277 NHL, and 210 skin melanoma.

Descriptive data (counts and percentages) were generated summarizing CM use reported by the sample. The CM items were further categorized into the 5 domains used by the National Center for Complementary and Alternative Medicine: alternative medical systems, mind-body methods, biologically based practices, manipulative and body-based practices, and energy medicine. Chi-square tests of independence were used to test associations between use of CM domains and survivors' medical and demographic characteristics.

Three different logistic regression models were used to examine associations between medical and demographic factors and CM use among survivors of sex-specific and non-sex-specific cancers. The first (overall) model examined whether cancer type and/or stage predicted use of CM domains, while controlling for sex, race, age, education, and time since diagnosis. Two additional models were used to deal with confounding between cancer type and sex. The sex-neutral model included survivors of sex-neutral cancers (colorectal, lung, NHL, kidney, bladder, or skin melanoma). The sex-specific model included only survivors with sex-specific cancers (breast, ovarian, uterine corpus, or prostate) and did not control for sex.

## RESULTS

### Sample Characteristics

Demographic and medical characteristics of the sample population are summarized in Table 1. Briefly, 57.6% of respondents were women, 87.5% were non-Hispanic White, 31.7% were aged  $\geq 65$  years, and the mean age was 58.5 years. More than a third (36.3%) held college or graduate degrees, and nearly 2 thirds (60.5%) reported a family income of at least \$40,000. Survivors were surveyed 10-24 months postdiagnosis (mean = 15.10 months; standard deviation = 3.70). Most subjects (59.7%) were survivors of in situ or localized cancers.

### Prevalence of CM Use

The CMs most frequently reported were prayer/spiritual practice (61.4%), relaxation (44.3%), faith/spiritual healing (42.4%), nutritional supplements/vitamins (40.1%), meditation (15%), religious coun-

**TABLE 1**  
Demographic and Medical Characteristics

	Frequency	Percentage*
Sex		
Men	1753	42.4
Women	2386	57.6
Racial group		
White†	3622	87.5
Black†	281	6.8
Hispanic	152	3.7
Others†	84	2.0
Age group, y		
20-48	866	21.0
49-54	906	21.9
55-61	760	18.4
62-70	775	18.8
71-96	821	19.9
Age at questionnaire completion	Mean, 58.48	SD, 12.44
Education		
<High school	400	9.8
High school graduate	1175	28.8
Some college	1025	25.1
$\geq$ College degree	1480	36.3
Income		
<\$20,000	540	15.1
\$20,000-\$39,999	870	24.4
\$40,000-\$74,999	1181	33.1
$\geq$ \$75,000	979	27.4
Cancer type		
Breast	1019	24.6
Prostate	814	19.7
Colorectal	610	14.7
Bladder	136	3.3
Uterine	215	5.2
Ovarian	270	6.5
NHL	277	6.7
Kidney	226	5.5
Lung	362	8.7
Skin melanoma	210	5.1
SEER stage		
In situ/localized	2472	59.7
Regional	1069	25.8
Distant	598	14.4

SD indicates standard deviation; NHL, non-Hodgkin lymphoma; SEER, Surveillance, Epidemiology, and End Results.

\* Percentage was generated based on nonmissing N.

† Not/unknown Hispanic.

seling (11.3%), massage (11.2%), and support groups (9.7%). Among the 19 CMs included in this study, the least prevalent were hypnosis (0.4%), biofeedback therapy (1.0%), and acupuncture/acupressure (1.2%; Table 2).

Prevalence estimates (the sum of prevalence for all individual methods from each category) for use of the 5 CM domains are shown in Table 3. Mind-body practices were used most frequently (74.4%). Because spirituality and religious practices may differ in im-

**TABLE 2**  
Frequency of Use for Each Complementary Method

	Count	Percentage
Alternative medical systems		
Acupuncture/acupressure	4134	1.2
Homeopathy	4111	1.9
Mind-body medicine		
Nonreligious/spiritual methods		
Aromatherapy	4132	4.1
Art	4123	1.9
Attended support groups	4128	9.7
Biofeedback therapy	4118	1.0
Hypnosis	4123	0.4
Imagery/visualization	4126	9.1
Meditation	4120	15.0
Relaxation	4112	44.3
Religious/spiritual method		
Faith/spiritual healing	4105	42.4
Prayer/spiritual practice	4113	61.4
Religious counseling	4103	11.3
Biologically based practices		
Herbal therapy	4127	6.5
Nutritional supplements/vitamins	4102	40.1
Special diet	4128	9.6
Manipulative and body-based practices		
Massage	4126	11.2
Energy medicine		
Tai chi/yoga	4114	4.7
Therapeutic touch	4103	3.0

portant ways from other mind-body methods, we determined the prevalence of religious/spiritual mind-body practices and the remaining mind-body practices in this domain: 64.6% and 51.9%, respectively. The least prevalent CM domain was alternative medical systems (2.9%).

### Predictors of CM Use in Univariate Analyses

Table 3 shows prevalence of use for the 5 domains according to patient clinical and demographic characteristics. In univariate analyses, use of 1 or more methods from any of these domains was significantly more common among women than among men, among individuals with more education, and among younger individuals (age younger than 55 years). Associations with race/ethnicity and income differed among the domains. Use of mind-body methods was most common among African Americans. Biologically based therapies were most commonly used by Hispanics and members of the "other racial groups" (eg, Asians) category. The association of CM use with educational level was particularly pronounced in the use of energy medicine and manipulative and body-based practices. Higher family income was associated with greater likelihood of using alternative

medical systems, biologically based practices, manipulative and body-based practices, and energy medicine. Use of all domains varied significantly by cancer type, with survivors of breast or ovarian cancer being most likely to use CMs in all domains.

### Predictors of CM Use in Multivariate Analyses

Results of 3 logistic regression models are summarized in Table 4. In all analyses except those restricted to sex-specific cancers (where sex was not considered a predictive variable), women were substantially more likely than men to use CMs. Among the associations with race and ethnicity, the most prominent is greater use of mind-body methods by African Americans, both overall and for spiritual as well as nonspiritual subsets. This was statistically significant in analyses of the 10 cancer types overall and for the 4 sex-specific cancers, but not for the 6 non-sex-specific cancers.

Age was inversely related to use of several CM domains, particularly when data for patients with all cancer types were analyzed. Compared with survivors who are college graduates, less educated survivors were less likely to use CM in several domains. Mind-body and biologically based practices were less influenced by education level than were other domains.

More advanced stage at diagnosis predicted greater likelihood of use for most domains. This association was not significant in analyses of sex-specific cancers only and was most likely a statistical power issue resulting from relatively few cases of patients initially presenting with advanced breast or prostate cancer. As in the univariate analysis, cancer type remained a significant predictor of CM use for several domains. In the overall model (including all 10 cancer types), melanoma (the reference group in these analyses) and kidney cancer survivors were least likely to use CMs, whereas breast and ovarian cancer survivors were most likely.

### DISCUSSION

This large, population-based survey of US cancer survivors provides unique information on the prevalence and medical-demographic correlates of CM use of cancer survivors. These findings extend previous research by demonstrating that survivors with distant disease use CMs at higher rates than survivors of local disease, and by documenting the size of this effect for a variety of CM modalities. Furthermore, the odds ratios from the logistic regressions indicate that type and stage of cancer predict CM use as well as demographic characteristics in all modalities

**TABLE 3**  
Percentage of Complementary Methods Used Listed by Clinical and Demographic Variables

	Alternative Medical System	Mind-Body Methods	Mind-Body Nonspiritual Only	Mind-Body Spiritual Only	Biologically Based Practices	Manipulative and Body-based Practices	Energy Medicine
Total	2.9	74.4	51.9	64.6	42.5	11.2	6.6
Sex	*	*	*	*	*	*	*
Male	1.4	63.3	42.8	50.7	32.9	3.9	1.9
Female	3.9	82.6	58.6	74.8	49.5	16.6	10.1
Race group		†	*	*	*		
White‡	2.8	73.8	51.1	63.8	41.4	11.3	6.8
Black‡	1.4	83.3	63.0	75.8	46.8	11.5	4.3
Hispanic	5.3	70.4	45.4	64.5	51.0	11.2	6.6
Others‡	4.8	78.6	61.9	64.3	60.7	7.2	6.0
Age group by quintile, y	*	*	*	*	*	*	*
20-48	4.3	78.3	55.3	67.9	47.2	19.0	10.9
49-54	3.5	80.4	56.4	69.2	45.9	15.8	9.6
55-61	3.6	75.3	50.9	66.2	42.4	11.4	6.4
62-70	1.8	72.1	48.4	63.9	39.4	5.7	3.5
71-96	1.0	65.4	47.7	55.5	36.3	2.9	1.9
Education	*	*	§	*	*	*	*
<High school	1.3	67.3	48.0	56.3	37.4	6.0	1.5
High school graduate	1.1	72.9	50.0	63.6	37.2	6.1	3.2
Some college	2.3	76.1	51.7	66.8	44.9	12.2	6.3
≥College degree	5.1	76.7	54.7	66.4	46.4	15.9	10.9
Income	*				§	*	*
<\$20,000	1.9	69.6	50.4	61.0	38.7	6.7	3.0
\$20,000-39,999	1.6	75.2	54.1	65.1	39.4	7.3	4.4
\$40,000-74,999	2.5	75.2	51.8	66.5	43.8	11.3	7.2
≥\$75,000	4.6	74.9	51.1	62.9	43.9	16.1	9.7
Cancer type	†	*	*	*	*	*	*
Breast	4.4	85.7	64.5	76.9	55.9	20.2	13.5
Prostate	1.6	62.0	41.0	49.4	29.9	3.1	1.5
Colorectal	2.1	74.3	52.0	65.4	44.6	7.1	3.9
Bladder	2.2	64.0	41.9	53.7	33.1	5.1	0.7
Uterine	2.3	77.2	50.2	69.3	34.4	9.8	6.5
Ovarian	4.8	85.9	65.6	79.6	55.9	18.3	10.8
NHL	3.6	80.9	56.7	69.6	47.7	15.9	8.7
Kidney	0.9	63.7	37.6	54.0	27.0	8.8	2.2
Lung	2.2	74.9	52.2	64.4	42.3	8.4	4.4
Skin melanoma	2.9	60.0	32.4	50.0	27.6	8.6	5.7
Stage of disease		*	*	*	*	*	*
In situ/localized	2.4	70.7	46.2	61.3	37.1	9.4	5.3
Regional	3.4	78.2	60.1	66.7	47.7	13.2	8.4
Distant	3.9	83.3	60.7	74.6	55.4	15.3	8.9

NHL indicates non-Hodgkin lymphoma.

\*  $P < .001$ .†  $P < .01$ .

‡ Not/unknown Hispanic.

§  $P < .05$ .

except use of alternative medical systems, for which disease characteristics were generally not predictive. Survivors of breast, ovarian, and NHL were the most likely to use CMs, and the odds ratios associated with these cancer types were among the most powerful in any of the models. As a whole, these results suggest that both demographics and disease characteristics are important predictors of CM use among cancer survivors, and that the cancer experience

plays an important role in determining individuals' CM use, and document the magnitude of the effect of a number important medical-demographic characteristics on each of several modalities of CM.

Other findings reported here were consistent with results of previous studies of those with or without a history of cancer, although variation among prior studies is substantial, and attributable to factors such as differences in populations studied and

**TABLE 4**  
**Logistic Regression Analyses of Complementary Method Use (Odds Ratios)**

	Alternative Medical System	Mind-Body Methods	Mind-Body Nonspiritual Only	Mind-Body Spiritual Only	Biologically Based Practices	Manipulative and Body-based Practices	Energy Medicine
Overall model							
Male	0.385*	0.484*	0.772†	0.418*	0.719†	0.336*	0.344*
Black	—	1.746†	1.528†	1.884*	—	—	—
Hispanic	—	—	—	—	1.583‡	—	—
Other	—	—	—	—	2.088†	—	—
Age	0.977†	0.987*	—	0.994‡	0.994‡	0.963*	0.972‡
<High school	0.257†	0.649†	0.780‡	0.623*	0.666†	0.466†	0.169*
High school graduate	0.224†	0.804‡	0.824‡	—	0.670*	0.372*	0.289*
Some college	0.455*	—	—	—	—	0.698†	0.521*
Regional	—	1.216‡	1.540*	—	1.310†	—	—
Distant	—	1.741*	1.582*	1.613*	1.992*	1.730†	1.934†
Breast	—	2.822*	3.146*	2.214*	2.680*	2.493†	2.072‡
Prostate	—	1.793†	1.750†	1.645†	—	—	—
Colon	—	1.922*	1.923*	1.936*	1.829†	—	—
Bladder	—	1.619‡	1.736‡	—	—	—	—
Uterine	—	1.598‡	1.848†	—	—	—	—
Ovarian	—	2.362†	2.843*	2.202†	1.942†	—	—
Non-Hodgkin lymphoma	—	2.329*	2.211*	1.944†	1.614‡	2.082‡	—
Kidney	—	—	—	—	—	—	—
Lung	—	2.002†	1.974*	1.806†	1.644‡	—	—
Time since diagnosis	1.090*	0.974‡	—	0.970†	—	—	—
Model 1: sex-neutral cancers							
Male	0.364†	0.473*	0.758†	0.410*	0.697*	0.336*	0.338*
Black	—	—	—	—	—	—	—
Hispanic	0.228†	—	—	—	1.783‡	—	—
Other	0.346‡	—	—	—	—	—	—
Age	—	0.988*	—	—	—	0.962*	0.961*
<High school	—	0.676‡	—	0.650‡	0.701‡	—	0.254‡
High school graduate	—	0.708‡	—	0.706†	0.633*	0.538†	0.477‡
Some college	—	—	0.744‡	—	—	—	0.558‡
Regional	—	—	1.473†	—	1.492†	—	—
Distant	—	1.845†	1.676*	1.564†	2.501*	2.481*	2.611†
Colon	—	1.999*	1.902*	2.136*	1.637†	—	—
Bladder	—	1.678‡	1.713‡	1.634‡	—	—	—
Non-Hodgkin lymphoma	—	2.288*	2.147*	2.045†	—	—	—
Kidney	—	—	—	—	—	—	—
Lung	—	2.102*	1.900†	2.046*	—	—	—
Time since diagnosis	1.085‡	0.970‡	—	—	—	—	—
Model 2: gender-specific cancers							
Black	—	1.856‡	1.601†	2.397*	—	—	0.378‡
Hispanic	—	—	—	—	—	—	—
Other	—	—	—	—	2.749†	0.124‡	—
Age	0.969†	0.984*	—	—	—	0.962*	0.977†
<High school	—	—	—	0.588†	0.568†	0.427‡	0.136†
High school graduate	0.213*	—	0.788‡	—	0.672*	0.292*	0.222*
Some college	0.536‡	—	—	—	—	0.695‡	0.510‡
Regional	—	1.313‡	1.652*	—	1.245‡	—	1.450‡
Distant	—	—	—	—	—	—	—
Breast	2.348‡	3.170*	2.381*	3.335*	2.877*	6.402*	8.527*
Uterine	—	1.859†	1.420‡	2.295*	—	2.652†	3.747†
Ovarian	2.746‡	2.912*	2.394*	4.267*	2.573*	6.047*	5.347*
Time since diagnosis	1.092†	—	—	0.968‡	—	1.039‡	—

Reference groups: sex, female; race, white; age, continuous; education, college degree and above; time since diagnosis, continuous; cancer type, skin melanoma (in Overall Model and Model 1, prostate (in Model 2); stage, in situ or localized.

\*  $P < .001$ .

†  $P < .01$ .

‡  $P < .05$ .

inconsistency in the way CAMs and CMs are defined. Women were more likely to use CM than men<sup>2,3,5,12,26,28-31</sup>; younger survivors were more likely than older survivors<sup>5,7,12,16,28</sup>; whites were more likely than nonwhites<sup>5</sup>; individuals with higher income were more likely than those with lower income<sup>1</sup>; and more educated survivors were more likely than less educated survivors.<sup>1,5,32</sup> This study found that the most common CMs used by cancer survivors are the same ones used by people without cancer, and even by people without any serious illness. Spiritual practices, relaxation methods, and dietary supplements are widely used in the general population and are also common among cancer survivors.<sup>26</sup> The analysis of the 2002 NHIS data for CAM use by US adults found that the most commonly used therapies were prayer for one's own health (43.0%), prayer by others for one's own health (24.4%), natural products (18.9%), deep breathing exercises (11.6%), participation in prayer group for one's own health (9.6%), meditation (7.6%), and chiropractic care (7.5%).<sup>2</sup> A 1993 study of unconventional medicine use in the United States<sup>4</sup> found that among the 16 unconventional therapies listed, the most commonly used (in the past year) were exercise (26%), prayer (25%), relaxation techniques (13%), and chiropractic (10%).

### Sex and CM Use

Our results are consistent with an apparently universal CAM research finding: women are more likely than men to use complementary or alternative therapies.<sup>2,3,5,26,28-31,33</sup> Univariate and multivariate analyses demonstrated for all domains significantly greater appeal to women than to men. The sex gap is narrowest for use of biologically based therapies (OR = 0.719) and the nonspiritual mind-body therapies (OR = 0.772), and widest for the manipulative and body-based practices (OR = 0.336) and energy medicine practices (OR = 0.344).

Unfortunately, relatively little information is available addressing the reasons for this notable disparity. Some potential explanations are that women tend to pay more attention to their health (eg, healthier behaviors,<sup>34</sup> more frequent physician visits<sup>35</sup>), possess a greater sense of self-efficacy in the area of health, or have a greater need for these therapies. The sex difference in CM use may also reflect societal norms that result in certain treatments being more attractive to women or less attractive to men. Many CMs involve emotional sharing or touching, which may be uncomfortable for men in the dominant US culture. Men may be less aware of CMs, perhaps because their social networks are less likely to discuss or encourage their use. Men may be more

likely to have inaccurate and negatively biased beliefs regarding CMs. Possibly the biologically based therapies are more appealing to men because they are perceived as more scientific or addressing physical rather than psychosocial needs. Ironically, the literature provides more convincing evidence for the benefit of nonbiologically based therapies than the biologically based therapies.<sup>36,37</sup>

### Age

This study's finding that CM use decreases with age is consistent with some, but not all, of the CM literature. A study of CAM use among persons aged  $\geq 50$  years found that use decreased with age. Persons aged 50 to 54 years (69%) and 55 to 64 years (70%) were more likely to have used a CAM practice than those aged  $\geq 65$  (54%).<sup>1</sup> An analysis of 2002 NHIS data found that age was positively correlated with CAM use if prayer was included.<sup>2</sup> If prayer (aside from praying for health for oneself) was excluded, all the CAM categories demonstrated "inverted U-shaped" relationships with age, with highest use levels among the middle-aged, whereas the youngest and oldest groups reported the least use of CAM.<sup>2</sup> This pattern was not found in our study, perhaps because of characteristics specific to cancer survivors and/or because our study included fewer young survivors.

The decreased use with age may seem counterintuitive, because older populations have poorer general health and more symptoms than younger populations, in part because the number of comorbidities tends to increase with age.<sup>38</sup> The expected finding would be a positive association between CM use and age, but our study (and others) found the opposite to be true. This is particularly striking in light of research linking CM use with chronic conditions.<sup>2-4,39</sup>

One study attempted to explain why those with the greatest burden of poor health were among the lowest users of CAMs in the general population.<sup>38</sup> The authors hypothesized that sociocultural differences in the interpretation of ailments as well as differences in beliefs about the appropriate response to these ailments contribute to anomalies in CAM use. Some evidence suggests that older adults tend to attribute poorer health and functioning to the effects of age or overexertion rather than illness,<sup>40</sup> and therefore may be less likely to see certain symptoms as requiring treatment. Differences in levels of CAM use could also be due in part to a stronger belief in conventional medicine among older adults.<sup>41,42</sup>

### Race and Ethnicity

As with prior research,<sup>3</sup> we found use of CMs higher in non-Hispanic whites than other ethnic and racial groups, with some variation based on the type of CM. Use of spiritual/religious mind-body CMs (faith/spiritual healing, prayer/spiritual practice, and religious counseling) was higher in African Americans than in non-Hispanic whites, Hispanics, and other races (75.8% vs 63.8%, 64.5%, and 64.3%), a finding reported in other studies.<sup>43</sup> More surprisingly, this pattern—although at comparatively lower levels of use across all racial/ethnic groups—was repeated for nonspiritual/religious mind-body practices (aromatherapy, art therapy, support group attendance, biofeedback therapy, hypnosis, imagery/visualization, meditation, and relaxation); 63.0% of African Americans reported using at least 1 of these CMs, compared with 51.1% of whites and 45.4% of Hispanics. “Other races” had a level of use similar to that of African Americans; 61.9% used at least 1 of these CMs. Use of alternative medical systems (in this study, acupuncture and homeopathy) was uniformly low across races (1.4% to 5.3%), but most prevalent in Hispanics and “other races.”

### Income and Education

We found that higher-income respondents were more likely to report CM use, particularly for certain domains (alternative medical systems, manipulative and body-based practices, and energy medicine). The cost of provider services or products for some CMs in these domains may contribute to this association. Prevalence of each of the 5 domains increased with educational level, although this trend was particularly marked for the same domains that were significantly associated with higher income levels.

One possible mediating factor is that levels of Internet use are related to income and education, and much information about CMs is disseminated on the Internet. This potential explanatory factor would need further research, however. In addition, some evidence suggests that differences in recall of past use may also contribute to apparent differences in use, with less educated individuals being less likely to remember that they used a CM within the past year.<sup>38</sup>

### Limitations

These results may suffer from some level of response bias based on the typical case recruitment rate (42.1%). Survivors of distant disease are less likely to respond to surveys,<sup>27</sup> so these results may underrepresent actual CM use among survivors. Nonethe-

less, the prevalence rates reported here are likely more accurate than those based on convenience samples used in other studies, and results of regressions can be expected to be accurate.

Another limitation involves omissions from the list of CMs included in our survey (eg, exercise and chiropractic). These omissions may lead to underestimates of aggregate use of CM domains, although it is likely that we are accurately measuring prevalence for individual CMs. In addition, the CM use question did not distinguish between subjects who began use of CMs after diagnosis or continued use that started before diagnosis. The wording of our question did assure that respondents used these CMs “...to help you deal with your cancer.”

### Future Directions

Future research should explore the reasons for the demographic associations observed in this and other studies. It is unclear whether the low CM use in some population segments is evidence of gaps in awareness or inaccurate biases against CMs that prevent some survivors from benefiting from these interventions. Surprisingly, some CMs with good evidence for their effectiveness are rarely used (eg, art therapy, acupuncture, and hypnosis).<sup>37,44-46</sup> Alternatively, CM use may accurately reflect the degree to which population segments benefit from these therapies. This distinction has important implications for integrative oncology practice and for public education regarding CMs.

Further research should investigate the connection between CM use and particular long-term and late effects of treatment, such as fear of recurrence or fatigue. Longitudinal studies are also needed to track changes in CM use as survivors move away from diagnosis. In addition, perceived benefits may be a valuable area for investigation.<sup>1,26,47</sup> Better understanding of the reasons for use and the psychological processes affecting CM use could increase understanding of the role that demographic variables play. One study of breast cancer patients suggested that locus of control affects CAM usage; higher perceptions of control over the course and cause of cancer significantly predicted CAM use.<sup>48</sup>

### Conclusions

This study provides information regarding prevalence and medical-demographic determinants of CM use reported by a large, population-based sample of survivors of 10 cancer types. Strengths of our study include its size and that cancer information is provided by cancer registries, providing greater accuracy than studies relying on patient recall, particularly

with respect to stage. Although clinic-based studies are important for planning integrative oncology services within that center, population-based data are needed to help focus nationwide research priorities on the most widely used CMs, to assess their effectiveness in improving survivors' quality of life.

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