

PUBLISHED VERSION

Adams, Robert John; Appleton, Sarah Louise; Cole, Antonia; Gill, Tiffany Kaye; Taylor, Anne Winifred; Hill, Catherine Louise.

Oral complementary medicine and alternative practitioner use varies across chronic conditions and attitudes to risk, *Journal of Clinical Epidemiology*, 2010; 2(1):251-260.

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2nd May 2011

<http://hdl.handle.net/2440/62808>

Oral complementary medicine and alternative practitioner use varies across chronic conditions and attitudes to risk

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Objectives: To determine whether chronic conditions and patient factors, such as risk perception and decision-making preferences, are associated with complementary medicine and alternative practitioner use in a representative longitudinal population cohort.

Participants and setting: Analysis of data from Stage 2 of the North West Adelaide Health Study of 3161 adults who attended a study clinic visit in 2004–2006. The main outcome measures were the medications brought by participants to the study clinic visit, chronic health conditions, attitudes to risk, levels of satisfaction with conventional medicine, and preferred decision-making style.

Results: At least one oral complementary medicine was used by 27.9% of participants, and 7.3% were visiting alternative practitioners (naturopath, osteopath). Oral complementary medicine use was significantly associated with arthritis, osteoporosis, and mental health conditions, but not with other chronic conditions. Any pattern of complementary medicine use was generally significantly associated with female gender, age at least 45 years, patient-driven decision-making preferences (odds ratio [OR] 1.38, 95% confidence interval [CI]: 1.08–1.77), and frequent general practitioner visits (>five per year; OR 3.62, 95% CI: 2.13–6.17). Alternative practitioner visitors were younger, with higher levels of education (diploma/trade [OR 1.88, 95% CI: 1.28–2.76], bachelor's degree [OR 1.77, 95% CI: 1.11–2.82], income > \$80,000 (OR 2.28, 95% CI: 1.26–4.11), female gender (OR 3.15, 95% CI: 2.19–4.52), joint pain not diagnosed as arthritis (OR 1.68, 95% CI: 1.17–2.41), moderate to severe depressive symptoms (OR 2.15, 95% CI: 1.04–4.46), and risk-taking behavior (3.26, 1.80–5.92), or low-to-moderate risk aversion (OR 2.08, 95% CI: 1.26–4.11).

Conclusion: Although there is widespread use of complementary medicines in the Australian community, there are differing patterns of use between those using oral complementary medicines and those using alternative practitioners.

Keywords: complementary medicine, chronic disease, risk attitudes, population study

Introduction

Population studies indicate that the use of complementary medicine has become increasingly popular in Australia and in other Western countries. There appears to be no consensus on the definition of “complementary medicine” therapy. Complementary medicine covers a range of oral supplements, herbal medicines, vitamins, and minerals. Some studies have also included chiropractic therapies, osteopathy, nutritional therapies, exercise-based therapies, aromatherapy, massage, and acupuncture. The National Institute for Complementary Medicine in Australia has adopted, with revisions, the four domains of complementary medicine articulated by the US National Center for Complementary and Alternative Medicine (www.nicm.edu.au). These four domains are mind-body medicine, biologically based practices, manipulative and body-based

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practices, and energy systems. In addition, whole medical systems are included which can cut across domains. These include homeopathy, naturopathy, and traditional Chinese medicine. This study focuses on biologically based practices (such as herbs, foods, and vitamins), including what the Australian Therapeutic Goods Administration defines and regulates as complementary medicines, and whole systems (such as naturopathy).

Despite the popularity of complementary medicine,^{1–3} previous Australian studies^{1,4–6} have not assessed complementary medicine use in relation to chronic conditions and risk factors, or identified preferences or risk perceptions of complementary medicine users. International surveys often find that oral complementary medicine use is more prevalent among younger women from higher socioeconomic backgrounds.^{2,3} However, one US study suggested that risk attitude is as strong a predictor of visits to alternative practitioners as are sociodemographic factors.⁷ This study also showed that attitudes to risk differed between people who used oral complementary medicine and those who attended complementary practitioners such as naturopaths. The latter group perceive themselves as risk-takers, compared with self-administering complementary medicine users who rated themselves not differently from the general population,⁷ but we are not aware that this research has been replicated. The relationship between dissatisfaction or distrust with orthodox medicine and complementary medicine use also remains unclear.^{8–10} An understanding of the relationship between complementary medicine use and preferences for autonomy in decision-making about care is also limited by a lack of representative data, but studies in selected populations suggest no relationship.^{8,11}

The aim of this population-based study was to assess the prevalence of oral complementary medicine use and the demographics of complementary medicine users; the associations of oral complementary medicine use and complementary practitioner visits with lifestyle risk factors and chronic medical conditions; and whether complementary medicine use is related to attitude to risk and decision-making. We also assessed the relationship between oral complementary medicine use and complementary practitioner visits and attitudes towards risk, participatory decision-making style, and satisfaction with conventional medicine, because this has rarely been described previously in a large representative population sample.

Methods

Sample population and study method

Participants of the North West Adelaide Health Study (NWAHS) were recruited from households randomly selected

from the electronic telephone directory in 2000–2002. At follow-up of the NWAHS cohort in 2004–2005 (response rate 81.0%), clinical assessment and medication data were available for 3161 individuals. The methods of the NWAHS¹² and the validity of these methods of selection to achieve an unbiased sample¹³ have been described previously. In particular, there were no major differences between study participants and the comparison population in terms of health indicators or lifestyle behaviors.¹⁴ The study was approved by the Institutional Ethics Committee of the North West Adelaide Health Service, and all subjects gave written informed consent.

Respondents completed telephone and written questionnaires, and underwent clinical assessment including spirometry, measurement of blood pressure, weight, height, and fasting blood tests for plasma glucose and lipids. Questionnaires collected information on health behaviors (smoking, recreational physical activity, and alcohol use), doctor-diagnosed conditions, including rheumatoid arthritis, osteoarthritis, osteoporosis, diabetes, chronic obstructive pulmonary disease, asthma, cardiovascular disease (myocardial infarction, angina, stroke) and mental health conditions, symptoms of joint pain (in foot, knee, hip, hand, and/or shoulder), depression, health service utilization (visits in the last 12 months to primary care providers, psychologists, chiropractors, and other therapists, including osteopaths and naturopaths), and demographics.

Current oral complementary medicine use was identified by asking participants to bring all medications, including prescription medications that they were currently using, to the clinic visit (Table 1). Information on duration of use was not obtained. Vitamin D, calcium, and iron supplements were not considered to be oral complementary medicines when

Table 1 Prevalence of oral complementary medicine use by type

Complementary medicine type % (n)			
Multivitamin	13.3 (420)	Black cohosh	0.6 (19)
Fish oil	6.0 (188)	Magnesium	0.6 (20)
Glucosamine/shark cartilage	5.7 (179)	Probiotics	0.5 (15)
Vitamin C	3.0 (95)	Saw Palmetto	0.4 (13)
Other herbal	2.8 (89)	St. John's wort	0.4 (12)
Vitamin B	2.7 (86)	Amino acid	0.4 (12)
Vitamin E	2.0 (62)	Flaxseed oil	0.3 (8)
Ginkgo biloba	1.6 (50)	Coenzyme Q10	0.3 (11)
Evening primrose oil	1.5 (48)	Celery	0.2 (6)
Garlic	1.4 (44)	Echinacea	0.2 (7)
Zinc	1.1 (36)	Ginseng	0.2 (5)
Mineral	0.8 (26)	Emu oil	0.1 (3)
Cod liver oil	0.7 (22)		

they had been prescribed by a medical practitioner for an underlying medical condition.

Chronic conditions

Undiagnosed joint pain was defined as pain in at least one site (foot, knee, hip, hand, shoulder) that had not been previously classified by a doctor as osteoarthritis, rheumatoid arthritis, or other arthritis. Diabetes, asthma, and chronic obstructive pulmonary disease were defined by clinic measurements or report of doctor-diagnosis, as has been described previously.¹² Asthma was defined as current self-reported physician-diagnosed asthma or demonstration of a significant bronchodilator response of at least 12% of baseline forced expiratory volume in one second (FEV₁) in the absence of a doctor-diagnosis of asthma.^{15,16} Participants with persistent airways obstruction, ie, postbronchodilator FEV₁/forced vital capacity (FVC) ratio less than 0.70¹⁷ were also identified as having chronic obstructive pulmonary disease. Diabetes was defined as fasting blood glucose ≥ 7.0 mmol/L, self-reported physician diagnosis of diabetes, or treatment for diabetes. Depression was assessed with the Center for Epidemiologic Studies Depression Scale (CES-D), a 20-item questionnaire which covers the major components of depressive symptomatology.¹⁸ CES-D scores range from 0 to 60, with scores 16–26 considered indicative of mild depression, and scores of ≥ 27 indicative of major depression.^{19,20}

Lifestyle variables

Body mass index (weight/height squared, in kg/m²) was categorized according to international criteria, ie, underweight/normal ≤ 24.9 , overweight 25.0–29.9, and obesity: ≥ 30.0 .²¹ Recreational physical activity was calculated as the number of times activity was undertaken by average time per session by (self-perceived) intensity²² and categorized as sedentary, low, moderate, and high exercise. Risk level of alcohol use (intermediate- to very high-risk) was classified as at least an average daily intake of four drinks (or 9–12 drinks in any day) in females and an average daily intake of 5–8 drinks (or occasional excess) in males.²³

Risk aversion, decision-making preferences, and satisfaction with care

An individual's level of risk aversion was assessed (n = 2342) by using questions based on data obtained from a National Patient Safety Foundation survey in America.²⁴ Risk aversion was assessed using the following questions: "On a scale of 1 to 7, with 7 = very risky and 1 = not risky at all, how risky do you think the following behaviors are:

- Not testing smoke detectors regularly if they are in your home?
- Leaving appliances plugged in while you are away for an extended period of time?
- Smoking tobacco or cigarettes?
- Using foodstuffs after use-by date?
- Driving a car after consuming alcohol?
- Not carrying medical identification when you have a medical condition such as allergies, diabetes, or epilepsy?"

The scoring system was modified (to take into account missing data on some items) so that the average of the responses to these six questions was used; 6.66–7 was coded as highly risk-averse, 5–6.65 was coded as moderately risk-averse, and < 5 were considered to be risk-takers.²⁵

Patient satisfaction with conventional medicine was assessed by the following question: "Thinking about your most recent experience with a doctor or hospital, how satisfied were you with the health care you received?" (very satisfied, somewhat satisfied, somewhat dissatisfied, very dissatisfied). Patient preferred decision-making was assessed by the response to: "In what way do you prefer to make decisions regarding your health care or medical treatments?" ("I prefer the final decision to be made:

By me (on basis of my own knowledge of risks/benefits or by strongly considering the doctor's opinion)

On an equal basis with the doctor

By the doctor (on the basis of their knowledge of risks/benefits or with my opinion considered)".

Statistical analysis

Data were weighted to census data by region, age group, gender, and probability of selection in the household, to provide population-representative estimates. Data were analyzed using SPSS (Version 15.0, SPSS Inc, Chicago, IL). Chi-square tests determined differences in proportions of those using complementary medicines in relation to sociodemographic, chronic disease, and chronic disease risk factors. All variables (chronic conditions, risk factors, health service use, individual factors such as risk aversion) were then entered into multivariable logistic regression analyses to develop separate models for the factors associated with oral complementary medicine use and alternative practitioner visits, adjusted for covariates including age, gender, smoking status, body mass index, and socioeconomic status (education, income, employment status). Variables were progressively removed from models and the effect on associations and the model-fit were examined. Results are expressed as odds ratios (OR) with 95% confidence intervals (CI).

Results

The prevalence of oral complementary medicine use by type is listed in Table 1. Overall 883 (27.9%) of study participants were currently taking one or more complementary medicines. The prevalence of subjects taking 1–2, 3–4, and ≥ 5 complementary medicines was 22.4% ($n = 709$), 4.5% ($n = 143$), and 1.0% ($n = 31$), respectively. Approximately half of all oral complementary medicines were reported to be taken for general health and well-being and one quarter were used for muscle, bone, and joint health (Table 2). At univariate level, oral complementary medicine use was associated with female gender, older age, and not being in the paid workforce, but not with other socioeconomic factors (education or household income). Only a limited range of chronic medical conditions were associated with increased oral complementary medicine use, including diagnosed arthritis (as well as symptoms of joint pain/stiffness), osteoporosis, chronic obstructive pulmonary disease, and mental health conditions (Table 3). Complementary practitioner visits (naturopaths, osteopaths) were reported by 7.3% ($n = 230$), and were associated with differing sociodemographics compared with oral complementary medicine users, including younger age, higher levels of education, and being in the paid workforce (Table 3). These differences are reflected in the significantly increased visits to complementary practitioners in those without risk factors or chronic disease. Table 4 shows that health care use in the previous 12 months was significantly associated with oral complementary medicine use, including visits to primary care providers, chiropractors, or alternative therapists.

In multivariable analyses, multiple oral complementary medicine use showed specific associations with social/biomedical factors compared with those using only one

complementary medicine, including normal body weight, higher income levels, with visits to psychologists and complementary practitioners and with patient driven/shared decision-making preferences (Table 5). In contrast, use of only one complementary medicine was significantly associated with higher education levels and specific morbidities (diagnosed arthritis, depressive symptoms).

Complementary medicine use was significantly associated with a patient-driven preference for decision-making in relation to their medical treatment, but not with attitudes towards risk-taking or patient satisfaction. In contrast, the visits to complementary practitioners were significantly associated with attitudes towards risk-taking (Table 4). People attending complementary practitioners were significantly more likely ($P < 0.05$) to be classified as risk-takers (36%) than either oral complementary medicine users only (14%) or nonusers (15%). There were no differences in the frequency of general practitioner visits between those who also attended complementary practitioners and those who did not. In regression analyses, complementary practitioner visitors were significantly associated with higher levels of education (diploma/trade [OR 1.88, 95% CI: 1.28–2.76], bachelor's degree [OR 1.77, 95% CI: 1.11–2.82]), annual household income of at least \$80,000 (OR 2.28, 95% CI: 2.28, 1.26–4.11), female gender (OR 3.15, 95% CI: 2.19–4.52), normal weight (OR 2.38, 95% CI: 1.51–3.76) or overweight (OR 2.04, 95% CI: 1.30–3.21), joint pain not diagnosed as arthritis (OR 1.68, 95% CI: 1.17–2.41), moderate to severe depressive symptoms (OR 2.15, 95% CI: 1.04–4.46), and with risk-taking behavior (OR 3.26, 95% CI: 1.80–5.92) or mild-moderate risk aversion (OR 2.08, 95% CI: 1.26–4.11).

People with mental health conditions were significantly more likely to report use of St. John's wort and vitamin supplements (Table 6). Those with diagnosed arthritis were significantly more likely to report use of fish oil and glucosamine or shark cartilage, compared with either people with undiagnosed joint pain or no joint pain. People visiting complementary practitioners (naturopath or osteopath) were significantly more likely to be using vitamin supplements, herbal preparations, probiotics, and black cohosh, as well as fish oil and glucosamine/shark cartilage.

Discussion

Our results confirm that oral complementary medicine use is common in the Australian community. We identified subjects currently taking oral complementary medicines, and this is likely to have resulted in the lower prevalence rate compared with previous population studies recording complementary medicine use in the previous 12 months.⁴

Table 2 Reasons for oral complementary medicine use identified by participants

Reason	%	n
General health and well-being	53.3	862
Muscles, bones, and joints	24.0	384
Nerves/stress/brain health	3.9	62
Premenstrual symptoms/menopause	3.6	57
Lung/sinuses	3.4	55
Skin	3.3	53
Circulation/cardiovascular disease	3.1	49
Gastrointestinal system and liver	0.7	11
Eye health	0.6	10
Prostate	0.5	8
Bladder/kidneys	0.2	3
Other	3.4	54
Total	100.0	1608

Table 3 Prevalence of oral complementary medicine and alternative practitioner use in relation to demographic factors, chronic disease, and chronic disease risk factors

Factors		Oral CM % (n)	P	Alternative practitioner % (n)	P
Demographics					
Sex	Male	21.4 (330)	<0.01	4.4 (69)	<0.01
	Female	34.2 (553)		10.0 (161)	
Age, years	<45	23.7 (363)	<0.01	8.8 (137)	<0.01
	45–64	31.7 (315)		7.4 (74)	
	65+	32.3 (205)		3.1 (19)	
Education	Secondary school	26.3 (384)	0.15	4.4 (65)	<0.01
	diploma, trade qualification	29.5 (340)		8.3 (96)	
	university degree	29.2 (159)		12.5 (68)	
Annual household income	<\$20,000	27.8 (166)	0.95	4.1 (24)	<0.01
	\$20,001–50,000	27.8 (288)		5.5 (58)	
	\$50,001–80,000	28.9 (239)		8.0 (66)	
	≥\$80,001	27.2 (151)		13.1 (73)	
Employed	No	30.7 (319)	0.01	4.2 (43)	<0.01
	Yes	26.4 (551)		8.8 (187)	
Chronic disease					
Diabetes	No	27.9 (814)	0.88	7.5 (220)	0.11
	Undiagnosed‡	25.0 (6)		3.6 (7)	
	Diagnosed‡	29.1 (58)		8.3 (2)	
Asthma	No	27.7 (722)	0.56	7.0 (182)	0.18
	Undiagnosed‡	26.8 (34)		7.9 (10)	
	Diagnosed‡	30.1 (122)		9.5 (38)	
Arthritis	No	25.7 (630)	<0.01	7.5 (188)	0.09
	Yes	36.1 (234)		5.6 (37)	
Joint pain/stiffness*	No	22.9 (300)	<0.01	6.3 (109)	<0.01
	Yes	32.1 (531)		8.5 (121)	
Osteoporosis†	No	27.4 (824)	0.007	7.4 (224)	0.23
	Yes	38.9 (44)		4.4 (5)	
Mental health condition†	No	26.8 (708)	<0.01	6.5 (173)	<0.01
	Yes	33.8 (161)		11.6 (56)	
Depressive symptoms (CES-D)	None	26.5 (725)	<0.01	6.9 (192)	0.11
	Mild	37.3 (100)		9.3 (25)	
	Moderate/severe	40.0 (44)		10.9 (12)	
CVD‡	No	27.9 (814)	0.62	7.5 (222)	0.03
	Yes	26.3 (54)		3.4 (7)	
COPD‡	No	28.1 (837)	0.03	7.3 (218)	0.15
	Yes	19.7 (24)		4.1 (6)	
Risk factors					
Smoking status	Never	28.7 (413)	<0.01	8.4 (120)	0.07
	Former	30.6 (330)		6.8 (74)	
	Current	21.8 (136)		5.6 (35)	
BMI‡	Normal	31.8 (334)	<0.01	9.2 (96)	<0.01
	Overweight	25.3 (299)		7.4 (88)	
	Obese	27.0 (251)		4.8 (45)	
High blood pressure‡	No	27.8 (645)	0.48	8.2 (191)	<0.01
	Yes	28.7 (233)		4.5 (37)	
High total cholesterol‡	No	28.0 (521)	0.88	7.9 (148)	0.10
	Yes	28.2 (362)		6.4 (81)	
Exercise level	Sedentary	29.3 (244)	0.77	3.8 (31)	<0.01
	Low	27.4 (291)		7.6 (81)	
	Moderate	28.8 (213)		9.0 (67)	
	High	26.8 (63)		14.5 (34)	
High-risk alcohol use	No	27.6 (791)	0.82	7.6 (216)	0.19
	Yes	28.5 (47)		4.8 (8)	

Notes: *Pain/stiffness in at least one site including hand, foot, shoulder, back, hip, and knee; [‡]self-reported doctor diagnosis; [‡]clinic determined.

Abbreviations: BMI, body mass index; CES-D, Center for Epidemiologic Studies Depression Scale; CM, complementary medicine; COPD, chronic obstructive pulmonary disease; CVD, cardiovascular disease.

Table 4 Oral complementary medicine and alternative practitioner use in relation to health service use in previous 12 months and patient factors

Health service providers		Oral CM use % (n)	P	Alternative practitioner % (n)	P
Primary care provider visits previous year	0	11.6 (31)	<0.01	9.5 (26)	0.30
	1–4	28.5 (468)		7.2 (120)	
	5+	30.6 (373)		6.8 (84)	
Psychologist	No	27.6 (846)	0.055	7.2 (224)	0.74
	Yes	41.0 (25)		8.3 (5)	
Chiropractor	No	26.4 (706)	<0.01	5.9 (159)	<0.01
	Yes	36.1 (163)		15.3 (70)	
Alternative therapist	No	26.4 (764)	<0.01		
	Yes	46.1 (105)			
Patient factors					
Risk aversion	Risk-takers	26.3 (93)	0.30	11.7 (42)	<0.01
	Moderately averse	30.4 (422)		8.7 (122)	
	Highly averse	28.9 (164)		3.9 (22)	
Patient satisfaction	Very satisfied	32.3 (317)	0.60	7.5 (74)	0.57
	Somewhat satisfied	29.4 (156)		9.4 (51)	
	Somewhat dissatisfied	29.6 (34)		9.6 (11)	
	Very dissatisfied	35.7 (15)		2.4 (1)	
Decision-making preferences	Patient decides	30.1 (286)	<0.01	9.2 (88)	0.37
	Shared decision	33.3 (230)		7.3 (52)	
	Doctor decides	24.6 (164)		7.0 (47)	

Abbreviation: CM, complementary medicine.

Consistent with previous studies, we found that women and those with postsecondary education were more likely to use oral complementary medicines.^{2–4,26,27} However, unlike other studies, we found that oral complementary medicine use was increased in older people (>45 years) compared with the younger age group, and numbers of complementary medicine used were associated with differing patterns of social and morbidity factors. This suggests that oral complementary medicine users are not homogeneous in terms of beliefs, motivations, and needs, and these differences need to be examined.²⁸ Awareness of psychosocial factors that influence complementary medicine use may help providers get a better understanding of the fit between the person and the intervention²⁹ and adjust treatment accordingly. People taking one oral complementary medicine were more likely to have diagnosed arthritis or a mental health condition, and attend their general practitioner frequently. It is possible that older people are more likely to use oral complementary medicines than other types of unconventional therapies, such as massage or exercise therapies, but this requires further investigation. Previous US work has indicated that older age is positively associated with dietary supplements but negatively correlated with alternative practitioner use.³⁰ This may also reflect general practitioners recommending certain oral complementary medicines to older people with chronic conditions where there is demonstrated or perceived

efficacy, eg, fish oil or St John's wort.³¹ However, the main reason cited by participants for complementary medicine use was for general health and well-being, rather than for specific conditions. This seems to be in accordance with our findings that never or reformed smokers rather than current smokers were more likely to use oral complementary medicines, and that participants with a healthy body mass index were more likely to be complementary medicine users.

A strength of our study is the analysis of complementary medicine use in relation to patient factors in a representative sample, which has been rarely reported. We found a positive association of oral complementary medicine use with patient decision-making preferences, in contrast with studies reporting no association.^{8,11} Consistent with previous findings,⁸ complementary medicine users are not rejecting the more conventional health care sector, because general practitioner visits were more frequent than among nonusers. Similarly, our findings indicate that oral complementary medicine use was not associated with dissatisfaction with health system experiences, consistent with previous reports in two representative samples from the US,^{8,10} or is unrelated to satisfaction with physicians.³²

People who saw a complementary practitioner (naturopath or osteopath) were more likely to report taking multiple oral complementary medicines, and were significantly more likely to be risk-takers than oral complementary medicine users, who were no different from the nonuser population in this

Table 5 Multivariable logistic regression analyses of factors associated with oral complementary medicine use overall and for patterns of oral complementary medicine use

Factors	Any oral CM use	One oral CM versus none	≥Two oral CMs versus none
Demographics	OR (95% CI)	OR (95% CI)	OR (95% CI)
Sex			
Male	1.00	1.00	1.00
Female	1.75 (1.42–2.15)	1.83 (1.40–2.41)	1.64 (1.25–2.16)
Age, yr			
<45	1.00	1.00	1.00
45–64	1.98 (1.55–2.51)	1.91 (1.41–2.60)	2.04 (1.49–2.81)
65+	2.47 (1.77–3.43)	2.05 (1.33–3.14)	2.90 (1.89–4.45)
Education			
Secondary	1.00	1.00	1.00
Diploma, trade qualification	1.33 (1.07–1.67)	1.53 (1.15–2.05)	1.15 (0.85–1.54)
University degree	1.23 (0.91–1.67)	1.51 (1.01–2.26)	1.05 (0.71–1.56)
Annual household income			
<\$20,000	1.00	1.00	1.00
\$20,001–50,000	1.53 (1.15–2.05)	1.29 (0.90–1.85)	2.00 (1.34–2.98)
\$50,001–80,000	1.78 (1.27–2.49)	1.44 (0.95–2.18)	2.33 (1.46–3.70)
≥\$80,001	1.64 (1.14–2.37)	1.20 (0.75–1.92)	2.30 (1.39–3.77)
Chronic disease			
Diagnosed joint pain*			
No	1.00	1.00	1.00
Diagnosed arthritis (OA/RA)	1.41 (1.07–1.85)	1.70 (1.20–2.43)	1.17 (0.82–1.68)
Undiagnosed joint pain	1.26 (1.01–1.59)	1.26 (0.94–1.71)	1.29 (0.95–1.74)
Depressive symptoms CES-D			
None	1.00	1.00	1.00
Mild	2.13 (1.52–3.00)	3.03 (2.06–4.45)	1.05 (0.63–1.75)
Moderate/Severe	1.78 (1.07–2.97)	2.14 (1.18–3.87)	1.57 (0.77–3.20)
Risk factors			
Smoking status			
Current	1.00	1.00	1.00
Never	1.07 (0.80–1.43)	0.81 (0.57–1.14)	1.65 (1.05–2.59)
Former	1.20 (0.88–1.59)	0.70 (0.49–1.01)	2.39 (1.52–3.77)
BMI[†]			
Normal	1.23 (0.96–1.57)	1.06 (0.78–1.48)	1.47 (1.06–2.03)
Overweight	0.80 (0.63–1.02)	0.82 (0.61–1.12)	0.78 (0.56–1.08)
Obese	1.00	1.00	1.00
Health service use in previous 12 months			
Primary care provider			
No visits	1.00	1.00	1.00
1–4	3.77 (2.24–6.33)	2.68 (1.42–5.07)	5.96 (2.62–13.5)
5+	3.62 (2.13–6.17)	2.41 (1.25–4.63)	6.21 (2.70–14.3)
Psychologist			
No	1.00	1.00	1.00
Yes	2.89 (1.51–5.53)	1.53 (0.64–3.66)	4.27 (2.00–9.13)
Alternative practitioners[‡]			
No	1.00	1.00	1.00
Yes	2.62 (1.87–3.66)	1.38 (0.85–2.23)	4.59 (3.11–6.78)
Risk aversion			
Risk-takers	1.35 (0.96–1.91)	1.23 (0.78–1.94)	1.39 (0.89–2.17)
Moderately averse	1.20 (0.94–1.53)	1.33 (0.97–1.81)	1.06 (0.77–1.47)
Highly averse	1.00	1.00	1.00
Decision-making preferences			
Patient decides	1.38 (1.08–1.77)	1.31 (0.96–1.79)	1.54 (1.11–2.15)
Shared decision	1.49 (1.16–1.92)	1.30 (0.94–1.80)	1.80 (1.28–2.53)
Doctor decides	1.00	1.00	1.00

Notes: *Pain/stiffness in at least one site including hand, foot, shoulder, hip, and knee; [†]clinic determined; [‡]includes visits to naturopath, osteopath.

Abbreviations: BMI, body mass index; CES-D, Center for Epidemiologic Studies Depression Scale; CI, confidence interval; CM, complementary medicine; OA, osteoarthritis; OR, odds ratio; RA, rheumatoid arthritis.

Table 6 Complementary medicine used in people with self-reported mental health disorders and joint pain, and in those seeing an alternative health practitioner (naturopath or osteopath)

CM (n)	Mental health condition		Joint pain			CM practitioner	
	No (2639)	Yes (477)	No (1235)	Diagnosed arthritis (648)	Joint pain with no arthritis diagnosis (1241)	No (2894)	Yes (228)
Number CMs							
0 (2247)	73.2 (1931)	66.2 (316)	78.1 (964)	63.9 (414)	70.5 (875)	73.6 (2129)	53.7 (123)
1–2 (696)	21.5 (568)	26.8 (128)	17.4 (215)	28.2 (183)	24.2 (300)	22.0 (636)	27.1 (62)
3–4 (142)	4.4 (115)	5.7 (27)	4.0 (49)	6.5 (42)	4.1 (51)	3.7 (107)	14.4 (33)
5+ (31)	0.9 (25)	1.3 (6)	0.6 (7)	1.4 (9)	1.2 (15)	0.7 (21)	4.8 (11)
All vitamins: Multi, B, C, E, Coenzyme Q10 (590)	18.2 (481)	22.8* (109)	16.7 (206)	18.4 (119)	21.4* (266)	17.6 (508)	36.0* (82)
Fish oil (205)	6.3 (167)	7.9 (38)	4.7 (58)	13.3* (86)	4.9 (61)	6.2 (180)	11.0* (25)
Glucosamine/shark cartilage (175)	5.6 (147)	5.9 (28)	1.8 (22)	13.7* (89)	5.1* (63)	5.1 (149)	11.0* (25)
Herbal [†] (139)	4.4 (117)	4.6 (22)	3.7 (46)	4.9 (32)	5.1 (63)	3.8 (110)	13.2* (30)
Mineral: Mg, Zn (78)	2.3 (61)	3.6 (17)	1.8 (22)	2.6 (17)	3.2 (40)	2.2 (65)	5.7* (13)
St. John's wort (12)	0.2 (6)	1.3* (6)	0.5 (6)	0.3 (2)	0.3 (4)	0.4 (11)	0.4 (1)
Ginkgo biloba (50)	1.6 (42)	1.7 (8)	1.2 (15)	2.3 (15)	1.7 (21)	1.6 (45)	2.2 (5)
Evening primrose (47)	1.6 (42)	1.0 (5)	1.6 (20)	1.1 (7)	1.6 (20)	1.5 (43)	2.2 (5)
Black cohosh (18)	0.4 (10)	1.7* (8)	0.3 (4)	0.9 (6)	0.7 (9)	0.5 (14)	2.2* (5)
Saw Palmetto (13)	0.5 (12)	0.2 (1)	0.3 (4)	0.6 (4)	0.5 (6)	0.4 (12)	0.4 (1)
Probiotics (15)	0.3 (9)	1.3* (6)	0.5 (6)	0.3 (2)	0.6 (7)	0.3 (9)	2.6* (6)

Notes: * $P < 0.05$ compared with those without the condition; [†]garlic, celery, ginseng, echinacea, "herbal", belladonna.

Abbreviation: CM, complementary medicine.

respect. Previous US survey data suggest that people who attend complementary practitioners perceive themselves as risk-taking, whereas those that only rely on self-administered complementary medicine treatment rate themselves as not being different from the general population.⁷ In a large US population study, risk attitude was as strong a predictor of visits to complementary medicine providers than the main sociodemographic predictors of female gender, higher education, or middle-age.⁷

Our study is limited by its measurement of current complementary medicine use, and we were unable to determine how long people had been using complementary medicines or whether complementary medicine usage had occurred in the recent past. We also do not know how frequently people were using complementary medicines. There was also a potential bias from survey nonresponse, although response rates in our sample were higher than for comparable biomedical population studies. The strength of this study is the large representative population sample with known probability of selection, measurements of other known chronic disease risk factors, and a low drop-out rate in follow-up, and that participants brought in all medications they were taking and that usage was clarified at the clinic visits.

Our data suggests the likelihood of a clear split in the approach to complementary medicines of primary care

physicians and other clinicians and that of complementary practitioners. General practitioners may be more comfortable recommending a limited range of complementary medicines where some evidence supports their use (eg, fish oil) and where the safety profile is reasonably well known and understood. In contrast, other health providers seem more likely to suggest other types of complementary medicines where evidence of efficacy is less well established (eg, probiotics) or the safety of these products is more problematic (eg, black cohosh),^{33,34} to their patients who are risk-takers and favor decision-making autonomy. Previous work has suggested people use complementary medicine "when it is consistent with their world view and conventional care is not relieving their symptoms".³² The side effects of conventional medicines in chronic conditions, such as mental health conditions and arthritis, and the longevity of treatment, may be prompts for individuals to seek alternative treatments which are perceived as "natural" and therefore less harmful and with fewer side effects. This raises issues of how health care services and regulators should respond to the annual expenditure of \$1.31 billion dollars on complementary medicines in Australia³⁵ that are taken mostly for "health and well-being". MacLennan et al have identified that many people incorrectly assume that the Australian Therapeutic Goods Administration audits the

efficacy and safety of complementary medicines⁴ and that complementary medicines are safe.⁶ The case for more detailed consumer product information for complementary medicine is given more credence if one considers both the variability in health literacy across the population³⁶ and the variability in complementary medicine products with similar names. The question of what constitutes “informed consent” under these circumstances needs greater clarification, in terms of risks and benefits by prescribers and also at the point of sale. This need to inform consumers would also apply to those complementary medicines where evidence indicates they are efficacious and appropriate, and should be considered as part of an evidence-based therapeutic regimen.

Acknowledgment

The research was funded by the Queen Elizabeth Hospital Research Foundation, the University of Adelaide, and South Australia Health.

Disclosure

The authors report no conflicts of interest in this work.

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