Title: Do Nurses' and Midwives' Roles, Health or Symptoms Influence their Personal Use of Ingestible Complementary and Alternative Medicines**?**

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Robyn-Gallagher is a co-investigator in this study. She contributed to all aspects of this research from concept, design to implementation, provided significant critical input to the paper and approved the final content.

Ethical approval

South Eastern Sydney Human Research Ethics Commitee: LNR11/POWH/242; University of Technology Sydney: LR/2013000741

Abstract

Objectives: To investigate the influence of work-related characteristics, health, health behaviours and symptoms on ingestible biologically-based Complementary and Alternative Medicine (CAM) use within the Australian nursing and midwifery workforce.

Background: CAM use is widespread worldwide, but there is little research into nurses' and midwives' personal use of ingestible CAM in Australia.

Methods: An online survey in 2014-15 used validated instruments and items to examine use of ingestible biologically-based CAM (herbs, foods and vitamins, minerals, amino acids, enzymes and other supplements), and the health and work-related characteristics of 5,041 nurses and midwives recruited through the New South Wales Nurses and Midwives Association and professional networks.

Results: A small proportion of nurses (6.8%) identified as personal CAM users. Most were female, older, worked in foundational roles (frontline Registered and Enrolled Nurses/Midwives) and used one CAM, most commonly a multivitamin, although Vitamin D, Fish Oil, Calcium and Glucosamine ± Chondroitin were also common. In comparison to non-users, CAM users were less likely to take sick days or indulge in risky drinking, but more likely to be symptomatic (with stiff joints, bodily/joint pain, severe tiredness, allergies, indigestion/heartburn), diagnosed with osteoarthritis and to adhere to healthy diet recommendations.

Conclusions: Findings showed a credible pattern of front line workers with physically demanding workloads that impact their physical health and are linked to frequent symptoms, using CAM treatments and achieving some success in being able to continue working and avoid sickness absence. Further

investigation is warranted to protect and maintain the health of the nursing and midwifery workforce.

Highlights:

- Study findings indicated front line nurses and midwives with physically demanding workloads that impact their physical health and are linked to frequent symptoms, use ingestible biologically-based CAM treatments and achieve some success in being able to continue working and avoid sickness absence.

- Better understanding of nurses' and midwives' knowledge and attitudes towards ingestible CAM, alongside information on their personal use, can be used to better prepare this workforce to make sound recommendations and support their patients and the community in relation to CAM use.

1. Background

Complementary and alternative medicines (CAM) have been described as 'practices and products that people choose as adjuncts to or as alternatives to Western medical approaches' (1) (pg 1281). In Australia, the Therapeutic Goods Administration defines complementary medicine as 'medicinal products containing such ingredients as certain herbs, vitamins and minerals, nutritional supplements, homoeopathic medicines and aromatherapy products' (2). A variety of terms are used interchangeably when referring to CAM (3-5), and CAM methods are broad, varied (6) and inconsistently operationalised (7). CAM methods or modalities include practitioner consultations (e.g. chiropractor, acupuncturist, etc.), as well as products that may or may not be recommended by a practitioner, purchased from health food stores, pharmacies, supermarkets or online (8).

CAM are generally used to prevent, treat or manage illness (5), with rationales for use including: (i) enhancing the mind's ability to influence bodily functions and symptoms (mind-body medicine); (ii) restoring health and overall well-being by manipulating the body and applying structured exercise regimes (manipulative and body-based practices); (iii) promoting health by identifying energy imbalances, healing the spirit and improving blood flow (energy medicine); and (iv) improving health through use of nature based products found in herbs, foods and vitamins (biologically-based practices) (8), a category which also includes minerals, amino acids, enzymes and other supplements for diet and health (9). This categorization is not universally applied and studies vary in relation to what is encompassed within each.

Data on CAM use from population-based surveys span at least 20-30 years in the US (10). Over that time steady use of CAM by general populations has been reported (11). In the UK, CAM use has remained consistent at one in four adults (12) since 1998, with an average one-year prevalence of CAM use at 41.1% (13). In the US, between 2002-2007, roughly four in ten adults (38.3%) used CAM within the previous 12 months (12), most commonly non-vitamin, non-mineral, natural products (11, 14). These products were defined as 'taken by mouth …contain(ing) a dietary ingredient intended to supplement the diet other than vitamins and minerals' (pg. 22), and included herbs, other botanical products (e.g. soy or flax), and dietary substances such as enzymes and glandulars, for example, echinacea, ginkgo biloba, ginseng, feverfew, garlic, kava kava, and saw palmetto (14).

In Australia between 1993 and 2005, between 50-70% of the general adult population used some form of CAM (15-18). In the 1996 round of the Australian Longitudinal Study on Women's Health, 19%, 28% and 15% of members of the young, mid-age and older cohorts in rural and remote areas reported CAM use (19). CAM is a big business; in 2010-11 Australians spent $2 billion on out of pocket expenses on complementary medicines, which exceeded the $1.6 billion costs of pharmaceutical medicines (20).

People who choose to use CAM generally do so in an attempt to improve their health and well-being, to alleviate symptoms associated with chronic or terminal illness or alleviate side effects associated with the use of conventional modern

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medicines (Table 1) (14, 21-23). In the Western world, this is most commonly applied as an adjunct to 'complement' conventional care (14). Musculoskeletal problems are the commonest medical conditions treated with CAM: for back pain/problems (17.1%), neck pain/problems (5.9%), joint pain/stiffness (5.2%) and arthritis (3.5%) (14). In 2012, 54.5% of US adults suffered with a musculoskeletal pain disorder and 41.6% of these were using CAM, including chiropractic/osteopathy, herbal/natural products, massage therapy and yoga (24). Recent reports suggest 8.7 million Australians (44.2%) use CAM (25), a lower rate than in the US, which might be linked to Australia's strict regulation of CAM (8) and hence possible trust of products.

Compared to many other countries, Australia has one of the most stringent regulatory frameworks for public supply of ingestible CAM. While these products are regulated as medicines under the Therapeutic Goods Act 1989 (26), CAM may not undergo as extensive research and testing through industry and government funding as conventional modern medicines (27). Limited scientific evidence of the safety and efficacy of CAM, and lack of policy often places healthcare professionals in difficult positions when it comes to making confident recommendations for use in professional practice (1, 9, 22, 27, 28).

CAM are not generally considered part of conventional modern medicine (29) but they are increasingly being integrated in healthcare delivery (30). This has driven inclusion of some knowledge of CAM into many medical, pharmacy and nursing degrees (31, 32). Professional factors such as discipline (GP, nurse or

midwife), training type (overtly evidence based or otherwise), setting and specialization (clinical experience) have been shown to influence attitudes to CAM more than personal factors such as ethnicity and personal use (33). There is a general consensus that doctors are more likely to hold negative attitudes towards CAM whilst nurses and midwives tend to be more supportive (22, 33-36). Nurses' and midwives' attitudes and beliefs towards CAM are commonly reported; one UK study, for example, found 70% felt CAM methods were effective (21). However, many healthcare professionals remain undecided (33, 37).

Healthcare professionals' referral/recommendation of CAM to patients is a common research topic (22, 35). Nurses and midwives commonly recommend CAM in pregnancy and for labour induction/augmentation; for nausea and vomiting, relaxation, back pain, anaemia, perineal discomfort, postnatal depression and lactation issues (7). Little research has been conducted on healthcare professionals' personal use of ingestible CAM (22) but the currently most commonly recommended and personally used biologically-based CAM are set out in Table 1 (21, 22, 38).

Table 1. Most common CAM: indications, recommendations and examples (14, 21-23, 38).

Indications for population use of CAM	
• Heart & circulatory health	• Immune system function
• Joint/ neck/ back pain	• Menopause
• Vitamin deficiency	• Skin conditions

Ingestible biologically-based CAM most commonly used by healthcare professionals	
• Red Raspberry Leaf	• Ginger
• Echinacea	• Lavender
• St Johns Wort	• Fish Oil
• Peppermint	• Cod Liver Oil
• Garlic	• Omega3
• Black Cohosh & Blue Cohosh	• Calcium
• Vitamins C, D and Multivitamin	

Ingestible biologically-based CAM most commonly recommended by healthcare professionals	
• Vitamins B6 & E	• Evening Primrose Oil
• Acidophilus	• Zinc
• Castor oil	

A range of personal and professional factors have been identified amongst healthcare professionals who recommend ingestible CAM to patients. These include the desire to enhance care and avoid medical interventions; philosophical alignment (7) and personal use (with perceived benefit) (30). Personal CAM use may potentially influence its incorporation with conventional healthcare (30); some studies found nurses recommended CAM therapies more often than they used them personally (38, 39), and others found high personal use associated with higher rates of recommendation to patients (6, 34). One study found healthcare professionals were eight times more likely to recommend CAM to pregnant women if they were themselves CAM users (6). Personal and professional factors found to inhibit nurses and midwives from confidently recommending CAM in practice include religious beliefs, communication issues, difficulty identifying a suitable indication, affordability, limited knowledge of CAM (7), limited scientific evidence and legislative concerns (40).

A small number of studies have examined the personal (rather than professional) use of ingestible CAM by nurses. Differences were seen between countries, with some studies finding a higher personal use of some form of CAM therapy compared to the general population (30, 34), whilst other studies found the reverse (39). The proportion of personal users varied between 83% to 74% of nurses in Sweden (40), Hong Kong (23) and Australia (38), to 41% of UK nurses (21). CAM products reported as used personally by nurses were essentially similar to those used by the general population for similar conditions (Table 1).

2. Methods

2.1 Aims

This paper focuses solely on biologically-based CAM: that is, ingestible forms of CAM including herbs, foods and vitamins, minerals, amino acids, enzymes and other supplements.

To date there is limited research into ingestible biologically-based CAM use by nurses and midwives, and the factors that influence this amongst these professional populations in Australia.

This study therefore investigates the influence of:

(i)   nurses' and midwives' health, health behaviours and symptoms (symptom type and severity) on ingestible biologically-based CAM use;

(ii)   nurses' and midwives' work-related characteristics on CAM use, including the number and details of CAM used.

2.2 Study Design & Sample

An online questionnaire was used to collect data from nurses and midwives working in New South Wales (NSW), Australia, between June 2014 and February 2015. To be eligible, participants needed to be working in NSW. Recruitment occurred through email to members of the NSW Nurses and Midwives Association (NSWNMA; the professional organisation), and through advertisements in trade journals, employment e-newsletters, professional nursing and midwifery networks and social media. It is not known how many

received information about the survey, but a total of 5,446 surveys were returned; 405 (7.4%) were excluded due to missing data or ineligibility. That is, these surveys were incomplete and the omitted data were too extensive to apply standard statistical imputation procedures. Survey responses were excluded as ineligible if the nurses and midwives did not work in NSW.

2.3 Data Collection

Demographic, workforce, general health, health behaviours and well-being characteristics were collected using validated national and international survey instruments and items, including from the Nurses and Midwives e-Cohort Study (NMeS) (41), the Australian Longitudinal Study on Women's Health (ALSWH) (42), the Australian Health Survey (43), the Medical Outcomes Survey Short Form 12 version 2 (SF-12 v2) (44-46), and the Insomnia Severity Index (47, 48).

Health-related characteristics included general health, diagnoses, symptom severity and frequency. Health-related behaviours included diet quality, physical activity, Body Mass Index (BMI), alcohol consumption and current smoking. Adequate vegetable and fruit intake were defined as five and two serves or more per day, respectively, based on Australian dietary guidelines (49). Recommendations for minimum activity levels internationally and in Australia are to accumulate 150 to 300 minutes of moderate intensity physical activity or 75 to 150 minutes of vigorous intensity physical activity, or an equivalent combination of both moderate and vigorous activities, each week. Obesity was identified as BMI ≥ 30.0 kg/m^2; risky drinking was defined as consuming more than two standard drinks per day on average or more than four on a single

occasion at least once a month. Current smokers included those who reported smoking daily, weekly and less than weekly. The details of survey variables, sources and psychometric assessments have previously been reported (50, 51).

2.4 CAM use

Survey participants were asked if they regularly take medications (prescription or non-prescription) and to list these. Non-prescription medication encompassed ingestible CAM. While pre-determined responses were available for selection for prescription medications, non-prescription medications required text entry.

2.5 Statistical Analysis

Data were entered into the Statistical Package for the Social Sciences (SPSS version 22.0 IBM, USA). Comparison of CAM use or non-use by nursing and midwifery roles (foundational, advanced practice, domain specific and AIN) and by health and health behaviours were conducted using Pearson's Chi-square test for categorical data and t-test for continuous data.

2.6 Ethical approvals

The study was approved by the relevant hospital and university Human Research Ethics Committees: South Eastern Sydney HREC: LNR11/POWH/242; University of Technology Sydney: LR/2013000741.

3. Results

3.1 Sample Characteristics

A total of 5,041 responses from nurses and midwives were analysed in relation to CAM use (n=343) and non-use (n=4698). The majority of CAM users were female (95.9%), with a mean age of 51.1 years (SD 10.1), working in metropolitan areas (68.0%), within hospital settings (58.0%), in foundational, front-line roles (as Registered and Enrolled Nurses and Midwives, Clinical Nurse/ Midwife Specialists; 70.8%) (Table 2).

Table 2. Sociodemographic and work characteristics by CAM use

Characteristic	CAM users (n=343)	CAM non-users (n=4698)	P and test value
Age, mean (SD)	51.1 (10.1)	47.7 (11.6)	<0.001
			$t(4461)=4.99$
Gender			
Female, n (%)	328 (95.9)	4093 (90.2)	<0.001
Male, n (%)	14 (4.1)	444 (9.8)	$X^2(1)=12.1$
Regular family carer, n (%)			
Yes	126 (38.4)	1435 (33.7)	0.08
No	202 (61.6)	2820 (66.3)	$X^2(1)=2.98$
Highest post-graduate qualification, n (%)			
Certificate	64 (19.8)	708 (17.1)	0.18
Diploma	32 (9.9)	441 (10.6)	$X^2(5)=7.67$
Bachelor degree	71 (21.9)	1152 (27.8)	
Post-grad certificate	57 (17.6)	744 (17.9)	
Post-grad diploma	43 (13.3)	440 (10.6)	
Masters degree or higher	57 (17.6)	663 (16.0)	
Current work location, n (%)			
Metropolitan	232 (68.0)	3081 (66.4)	0.54
Non-metropolitan	109 (32.0)	1559 (33.6)	$X^2(1)=0.38$

Current work setting, n (%)			
Hospital	199 (58.0)	2806 (59.7)	0.27
Community; general practice; outpatient	74 (21.6)	822 (17.5)	$X^2(3)=3.94$
Residential aged care; rehab/disability	42 (12.2)	644 (13.7)	
Other	28 (8.2)	426 (9.1)	
Foundational*			
(RN, RM, EN, CNS, CMS), n (%)	242 (70.8)	3318 (71.8)	0.001
Advanced practice (NP, CNC, MP, CMC), n	35 (10.2)	345 (7.5)	$X^2(3)=15.4$
(%)	61 (17.8)	712 (15.4)	
Domain specific (educator, manager,	4 (1.2)	247 (5.3)	
researcher), n (%)			
AIN, n (%)			

RN, registered nurse; RM, registered midwife; EN, enrolled nurse; CNS, clinical nurse specialist; CMS, clinical midwife specialist; NP, nurse practitioner; CNC, clinical nurse consultant; MP, midwife practitioner; CMC, clinical midwife consultant

3.2 CAM use and non-use

Only a small minority (6.8%) of respondents identified as current users of CAM. Of these, most used one CAM (54.5%); roughly one quarter (26.2%) used two, with the remainder (19.2%) using three or more CAM. Postgraduate qualifications did not influence CAM use (p=0.096) but a significant difference was noted across nursing roles (p=0.001), with greater use amongst advanced practice and domain-specific roles (Table 2).

The most common CAM used were vitamins and minerals (68.9%), sources of Omega-3 (19.7%), and Glucosamine ± Chondroitin (11.4%). Table 3 displays the most common CAM used across nursing roles, and all CAM used are listed in Table 4.

Table 3. Comparison of most common CAM used by nursing role*

Ingestible biological CAM type	Foundational (n=242)	Advanced practice (n = 35)	Domain specific (n=61)	AIN (n=4)	Total CAM use (N=342)
Multivitamin, n(%)	72 (29.8)	11 (31.4)	20 (32.8)	0 (0.0)	103 (30.1)
Vitamin D, n(%)	66 (27.3)	7 (20.0)	16 (26.2)	1 (25.0)	90 (26.3)
Fish Oil, n(%)	53 (21.9)	9 (25.7)	10 (16.4)	0 (0.0)	72 (21.1)
Calcium, n(%)	36 (14.9)	5 (14.3)	14 (23.0)	1 (25.0)	56 (16.4)
Glucosamine ± Chondroitin, n(%)	45 (18.6)	5 (14.3)	5 (8.2)	0 (0.0)	55 (16.1)
Vitamin B/Folate/B12, n(%)	21 (8.7)	3 (8.6)	7 (11.5)	0 (0.0)	31 (9.1)
Krill Oil/Red Krill Oil, n(%)	17 (7.0)	2 (5.7)	4 (6.6)	0 (0.0)	23 (6.7)
Magnesium, n(%)	15 (6.2)	2 (5.7)	5 (8.2)	1 (25.0)	23 (6.7)
Iron, n(%)	11 (4.6)	2 (5.7)	1 (1.6)	1 (25.0)	15 (4.4)
Vitamin C, n(%)	13 (5.4)	0 (0.0)	2 (3.3)	0 (0.0)	15 (4.4)

'Vitamins and Minerals' include multivitamins, Vitamin D, Calcium, Vitamin B, Magnesium, Iron and Vitamin C; 'Sources of Omega 3' include Fish Oil and Krill Oil.

Table 4. CAM Personal Use by Nurses and Midwives in Australia (ingestible biologically-based variety only)

CAM used	Total CAM use (N=342)	CAM used	Total CAM use (N=342)
Glucosamine, n(%)	49 (14.33)	Celery Capsules, n(%)	1 (0.29)
Glucosamine with Chondroitin, n(%)	6 (1.75)	Omega3, n(%)	6 (1.75)
Calcium, n(%)	56 (16.37)	Cranberry Tabs, n(%)	2 (0.58)
Evening Primrose Oil, n(%)	8 (2.34)	Lyprinol, n(%)	0 (0.00)
Not Specified, n(%)	6 (1.75)	Triple Joint Repair, n(%)	1 (0.29)
Magnesium, n(%)	23 (6.73)	Zinc, n(%)	7 (2.05)
Multivitamin, n(%)	103 (30.12)	Valerian, n(%)	2 (0.58)
Vitamin D, n(%)	90 (26.32)	Mineral Supplement (Not specified) n(%)	2 (0.58)
Vitamin B/Folate/B12, n(%)	31 (9.06)	Green Tea, n(%)	1 (0.29)
Krill Oil/Red Krill Oil, n(%)	23 (6.73)	Paw Paw Juice, n(%)	1 (0.29)
Fish Oil, n(%)	73 (21.34)	Turmeric, n(%)	1 (0.29)
Macuvision, n(%)	1 (0.29)	St Johns Wort, n(%)	8 (2.34)

Iron, n(%)	15 (4.39)	Olive Leaf Extract, n(%)	3 (0.88)
For Sleep (Not Specified), n(%)	5 (1.46)	Nutriceutical For Pain (Not Specified), n(%)	1 (0.29)
CQ10, n(%)	5 (1.46)	Echinacea, n(%)	2 (0.58)
For Menopause/HRT (Not Specified) , n(%)	10 (2.92)	Herbal Anti-inflammatory (Not Specified), n(%)	2 (0.58)
Vitamin C, n(%)	15 (4.39)	Thyroid Health, n(%)	1 (0.29)
Garlic, n(%)	6 (1.75)	Green Lipped Muscle, n(%)	2 (0.58)
Flaxseed Oil, n(%)	2 (0.58)	Naturopathic Medicine (Not Specified), n(%)	4 (1.17)
Saw Palmetto, n(%)	1 (0.29)	Maca, n(%)	1 (0.29)
For Depression (Not Specified) , n(%)	1 (0.29)	Cucurmin	2 (0.58)
Horseradish & Garlic, n(%)	1 (0.29)	Antioxidants (Not Specified), n(%)	1 (0.29)
Melatonin, n(%)	3 (0.88)	Grapeseed Extract, n(%)	1 (0.29)

Chinese Herbal Medicine (Not Specified), n(%)	3 (0.88)	Rescue Remedy, n(%)	1 (0.29)
For Joints (Not Specified), n(%)	3 (0.88)	Bach Flower Remedies, n(%)	1 (0.29)
Probiotic, n(%)	10 (2.92)	IBS Support, n(%)	1 (0.29)
Vitex for Sleep/PMS, n(%)	1 (0.29)	Iodine, n(%)	1 (0.29)
Remifemin, n(%)	6 (1.75)	Rose Hip Vital, n(%)	1 (0.29)
Immune Booster, n(%)	2 (0.58)	For Bones (Not Specified), n(%)	1 (0.29)
		Vitamin E, n(%)	1 (0.29)

3.3 Health Characteristics

Overall nurses and midwives perceived their general health as 'good' to 'very good', irrespective of CAM use (31.6% and 41.5%) or non-use (35.0% and 37.7%). Compared to participants who did not use CAM, those who used CAM were less likely to take at least one day of sickness absence (75.5% vs 80.9%; p = 0.016) (Table 5).

Overall there was no significant difference between CAM users and non-users in relation to the most prevalent diagnosed diseases but a significant difference was observed for osteoarthritis, with those affected more likely to be CAM users (Table 5).

Similarly there was no significant difference between CAM users and non-users in relation to most of the prevalent symptoms experienced in the last 12 months. However, a significant difference was seen in the frequency with which they reported bodily pain, severe tiredness, stiff/ painful joints, allergies/hayfever/sinusitis, and indigestion/heartburn. More CAM users experienced these symptoms 'sometimes' to 'often' compared to non-users (p ≤0.05) (Table 4).

Table 5. Health characteristics by CAM use

Characteristic	CAM users (n=343)	CAM non-users (n=4698)	P and test value
General health			
Excellent, n (%)	34 (9.9)	606 (12.9)	0.18
Very good, n (%)	142 (41.5)	1766 (37.7)	$X^2(4)=6.25$
Good, n (%)	108 (31.6)	1642 (35.0)	
Fair, n (%)	48 (14.0)	574 (12.2)	
Poor and very poor, n (%)	10 (2.9)	101 (2.2)	
Sickness absence			0.016
At least one sick day, n (%)	259 (75.5)	3799 (80.9)	$X^2(1)=5.84$
Most prevalent diagnosed diseases			
Osteoarthritis, n (%)	73 (21.3)	570 (12.3)	<0.001 $X^2(1)=24.0$
Other arthritis	28 (8.2)	278 (6.0)	0.09 $X^2(1)=2.82$
Hypertension, n (%)	59 (17.3)	808 (17.5)	0.99 $X^2(1)<0.001$
Depression, n (%)	80 (23.3)	971 (20.7)	0.24 $X^2(1)=1.37$
Asthma, n (%)	44 (12.9)	711 (15.4)	0.25 $X^2(1)=1.34$
Anxiety, n (%)	51 (14.9)	662 (14.1)	0.69

Frequency of most prevalent symptoms in last 12 months			
Back pain, n (%)			
rarely to never	108 (39.1)	1590 (42.2)	0.34
sometimes to often	168 (60.9)	2181 (57.8)	$X^2(1)=0.97$
Severe tiredness, n (%)			
rarely to never	97 (37.0)	1556 (43.2)	0.05
sometimes to often	165 (63.0)	2050 (56.8)	$X^2(1)=3.74$
Stiff joints, n (%)			
rarely to never	92 (33.9)	1779 (49.4)	<0.001
sometimes to often	179 (66.1)	1825 (50.6)	$X^2(1)=24.0$
Headaches/migraine, n (%)			
rarely to never	128 (50.3)	1812 (49.5)	0.79
sometimes to often	126 (49.7)	1848 (50.5)	$X^2(1)=0.07$
Allergies/hay fever/sinusitis, n (%)			
rarely to never	141 (51.6)	2168 (58.0)	0.04
sometimes to often	132 (48.4)	1573 42.0)	$X^2(1)=4.14$
Indigestion/heartburn, n (%)			
rarely to never	157 (61.3)	2313 (67.3)	0.05
sometimes to often	99 (38.7)	1123 (32.7)	$X^2(1)=3.86$
Breathing problems, n (%)			
rarely to never	196(87.1)	2851 (87.9)	0.73
sometimes to often	29(12.9)	391 (12.1)	$X^2(1)=0.14$

Bodily pain, n (%)			
rarely to never	64 (19.0)	1238 (26.7)	0.002
sometimes to often	273 (81.0)	3408 (73.4)	$X^2(1)=9.54$
Severity of pain, n(%)			
none to mild	223 (66.0)	3072 (66.2)	0.944
moderate to very severe	115 (34.0)	1571 (33.8)	$X^2(1)=0.005$
Current sleep problem, n (%)			
No clinically significant insomnia	136 (40.4)	1948 (43.5)	0.08
Subthreshold insomnia	127 (37.7)	1428 (31.9)	$X^2(3)=6.66$
Clinical insomnia (moderate severity)	55 (16.3)	736 (16.4)	
Clinical insomnia (severe)	19 (5.6)	370 (8.3)	

3.4 Health-related behaviours and CAM use

While a larger number of CAM users than non-users met the recommended targets for vegetable/fruit consumption and physical activity, this was only statistically significant for fruit consumption (p<0.001). CAM users had significantly lower rates of risky drinking than CAM non-users (p<0.001) (Table 6).

Table 6. Health-related behaviours by CAM use

Health behaviours	CAM users N (%)	CAM non-users N (%)	P and test value
BMI, mean (SD)	28.3(6.3)	27.8 (6.4)	0.222 $t(4586)=1.22$
Met vegetable consumption recommendation			
No	283 (87.4)	3713 (89.3)	0.28
Yes	41 (12.7)	446 (10.7)	$X^2(1)=1.16$
Met fruit consumption recommendation			
No	112 (34.7)	1928 (46.2)	<0.001
Yes	211 (65.3)	2246 (53.8)	$X^2(1)=16.0$
Met exercise recommendation			
No	168 (51.7)	2256 (53.6)	0.51
Yes	157 (48.3)	1954 (46.4)	$X^2(1)=0.44$
Obesity			
No	223 (69.5)	2970 (70.4)	0.73
Yes	98 (30.5)	1249 (29.6)	$X^2(1)=0.12$
Risky drinking			
No	232 (77.9)	2504 (67.7)	<0.001
Yes	66 (22.2)	1196 (32.3)	$X^2(1)=13.2$
Current smoking			

No	301 (92.6)	3774 (89.6)	0.09
Yes	24 (7.4)	437 (10.4)	$X^2(1)=2.96$

4. Discussion

This study investigated nurses' and midwives' work, health and health behavioural characteristics in relation to their personal use of ingestible biologically-based CAM. A small proportion of nurses and midwives identified as personal users of CAM, more than half of whom used only one CAM. Most users were in foundational professional roles and, compared to non-users, were significantly more likely to suffer from osteoarthritis and be symptomatic, suffering pain, severe tiredness, stiff/ painful joints, allergies and indigestion/heartburn at greater frequency. However, overall, nurses and midwives perceived their general health as 'good' to 'very good' irrespective of CAM use or non-use, which concurs with other findings from Australia (25). There was some indication of a trend towards greater health consciousness amongst CAM users (greater adherence to dietary recommendations and less risky drinking) but findings cannot indicate whether personal CAM use was a result of being health conscious or whether these workers feel healthy because they use CAM.

In other countries and other Australian studies, a higher proportion of nurses and midwives reported use of some or all forms of CAM, when compared to the present study (21, 23, 30, 38, 40). However, there were differences in how CAM was defined. Some studies included a variety of CAM modalities (i.e. both biological and non-biological therapies) in their definition, whilst other studies focused specifically on the biologically-based variety of CAM. Disparities can also be attributed to differences in sample populations, with some studies including other healthcare workers (physicians, technicians, support workers,

administrative/management, students) in addition to nurses and midwives (30, 39). Studies compared CAM use by nurses and midwives across countries, conducting sub-analyses for biological varieties of CAM and analyses for all form of CAM modalities used. In Australia in 2002, of 74% who used any form of CAM therapy/modality, 19.1% of nurses and midwives reported personal use of herbal medicines (biological CAM) (38); in Sweden of 83% who used any form of CAM, 51.3% used herbal medicine (40); in Hong Kong, of 80% reporting use of any form of CAM, 50.3% reported personal use of Chinese herbal medicine (23). Additionally, in an Israeli study, of 87.3% using any form of CAM modality, 48.6% of nurses and midwives reported using biologically-based CAM (34). These analyses all locate these Australian nurses as much lower CAM users than in other countries, for all forms/modalities of CAM but for biologically-based CAM in particular. Further, this study findings demonstrate three-fold reduction in proportions using personal biologically-based CAM compared to an earlier Australian study (6.8% vs 19.1%, respectively) (38). With more than a decade between studies, further study is warranted to identify whether this is a real substantial reduction in CAM use by Australian nurses, or whether this is yet another artefact of inconsistent definitions and varying methods.

4.1 Factors influencing CAM use

Age and gender are well-known to play an important role in CAM use, with females and people aged > 50 years more frequent users (25, 52, 53), as in this study. In an Australian study, CAM use was linked to a range of socio-demographic variables; similar to this study, biologically-based therapies were more commonly used by patients who were female and living in metropolitan

areas (54) (Table 2). Tailored marketing of popular CAM brands towards women's health is thought to play a role (25). Recently, in an Australian general population study, women (50.4%), expectant mothers (66.2%), mothers of children aged between 0-5 years (51.9%), and people who are diet conscious (25) were shown as more likely to use CAM. As with the nurses and midwives, individuals more concerned about their overall health were more likely to use CAM, even if their overall health was at least as good or better than that of non-users (25).

Older nurses and midwives are also more likely to suffer physical health problems with higher pain scores (55-57). There are several likely reasons for this: nursing and midwifery work is physically demanding, particularly for front line staff who are often required to move patients and objects (58), and are at increased likelihood of injuries (e.g. back/shoulder) with greater years in the workforce (58, 59). With increased age tends to come declining physiological and functional capacity (60, 61) and increased likelihood of age-related chronic health problems such as arthritis and musculoskeletal disorders (55, 56). Declining work performance and functional capacity may explain, in part at least, the choices of this older cohort of CAM users of, predominantly, Fish Oil, Calcium and Glucosamine/Chondroitin use. These most commonly used CAM are also commonly used by older people in general and indicated for heart, circulatory, joint and bone health.

Foundational front line workers were the workforce group most likely to use CAM, and CAM users were less likely to take sickness absence. Could it be that

these frontline workers, experiencing demanding workloads that impact their physical health (e.g. joints/back), are seeking and finding some success in using CAM to alleviate symptoms and continue working? Or do some nurses and midwives have no choice but to work and hence seek any form of support to treat symptoms?

Nurses' and midwives' CAM choices have been shown to be similar to those of the Australian population. Population studies have shown people with vitamin deficiency more likely to use CAM, and in Australia, 75.4% of people with vitamin deficiency take vitamins (25). It is therefore not surprising that vitamin D was amongst the most common CAM used, given the high prevalence of vitamin D deficiency in the Australian population, particularly amongst females (62).

4.2 Factors influencing non-use of CAM

One study found that, with little formal training on CAM use, 21% of doctors were not open to CAM use, 33% of nurses were unsure of their medical colleagues' stance on CAM use in practice, and only 25.3% of respondents felt comfortable recommending CAM (22). Low levels of comfort in discussion of CAM, inadequate personal knowledge and negative views of co-workers may be linked with the low personal use of CAM demonstrated by nurses in this study.

Positive associations between nurses' knowledge and attitudes towards CAM have been documented (63). A conceptual framework based on the Theory of Reasoned Action (64) argues that if nurses have greater knowledge of scientific evidence supporting CAM, in addition to positive personal experiences using

CAM, this might influence their attitudes and beliefs towards CAM and increase their likelihood of supporting CAM use in practice (9). While this study did not report these nurses' knowledge of CAM, a model such as this indicates potential positive influences on personal (in addition to professional) use of CAM.

4.3 Limitations

Examination of CAM use comprised a small part of a much larger survey of nurses' health; this was a sub-study and not specifically designed to determine CAM use. Findings may have been influenced by recall or response bias, or survey fatigue. CAM use may have been under-reported given there was no specific survey question targeting CAM use or selection menu of specific examples of CAM modalities. For a holistic understanding of these findings, further work should more comprehensively explore the impact of nurses' and midwives' knowledge and personal beliefs/attitudes on CAM use.

5 Conclusions

It is difficult to compare CAM use (both personal and professional) across studies due to differences in research methods, definitions or categories of CAM, and varying inclusion/exclusion of various grades of healthcare and nursing staff. The current paucity of data and hence limited information on trends of CAM use, requires repeat surveys using high quality and consistent methods, and definitions for CAM. International consensus agreement on research methods and reporting approaches will be required in order to make meaningful comparisons across and within countries and studies.

Future work should also explore nurse and midwife CAM education and knowledge, beliefs and attitudes towards CAM, and willingness and ability to recommend or refer to CAM, in practice and for personal use. Better understanding of nurses' and midwives' knowledge and attitudes towards CAM, alongside information on their personal use, can better prepare this workforce to make sound recommendations and support their patients and the community in relation to CAM use.

Findings of this study have implications for nursing practice. Whilst numbers were unexpectedly low, the study nonetheless showed a credible pattern of front line workers with physically demanding workloads that impact their physical health and are linked to frequent symptoms such as bodily pain, severe tiredness and stiff/ painful joints, using CAM treatments and perhaps achieving some success in being able to continue working and avoid sickness absence. Further investigation is warranted, to protect and maintain the health of the nursing and midwifery workforce.

Declarations of Interest

No conflicts of interest to report.

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