Cyclic perimenstrual pain and discomfort and the role of complementary and alternative medicine in its treatment

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Certificate of original authorship

I certify that the work in this thesis has not previously been submitted for a degree nor has it been submitted as part of requirements for a degree except as fully acknowledged within the text.

I also certify that the thesis has been written by me. Any help that I have received in my research work and the preparation of the thesis itself has been acknowledged. In addition, I certify that all information sources and literature used are indicated in the thesis.

I would like to acknowledge with gratitude that this research was supported by an Australian Government Research Training Program.

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Statement of contributions to jointly authored works contained in the thesis

The results from this thesis have been submitted for publication in peer-reviewed journals through five articles (one integrative literature review paper and four discrete original articles), presented in Chapter 2, Chapter 4, Chapter 5, Chapter 6 and Chapter 7. For each of these papers, I have been primarily responsible for determining the research question, undertaking the analysis and drafting the manuscript.

Support in all of these areas has been provided by Professor David Sibbritt and Professor Jon Adams, Doctor Louise Hickman and Doctor Jane Frawley.

I take full responsibility in the accuracy of the findings presented in these publications and this thesis.

Published works by the author incorporated into the thesis

The following are the published papers contained within this thesis:-

1. Fisher C, Sibbritt D, Hickman L, Adams J. (2016) A critical review of complementary and alternative medicine use by women with cyclic perimenstrual pain and discomfort: a focus upon prevalence, patterns and applications of use and users' motivations, information seeking and self-perceived efficacy. *Acta Obstetricia et Gynecologica Scandinavica*. 95(8): 861-871.

2. Fisher C, Adams J, Hickman L, Sibbritt D. The use of complementary and alternative medicine by 7427 Australian women with cyclic perimenstrual pain and discomfort: a cross-sectional study. *BMC Complementary and Alternative Medicine.* 2016; 16 (1):1-11.

3. Fisher C, Hickman L, Adams J, Sibbritt D. Cyclic Perimenstrual Pain and Discomfort and Australian Women's Associated Use of Complementary and Alternative Medicine: A Longitudinal Study. *Journal of Women's Health.* 2018; 27 (1):40-50.

4. Fisher C, Adams J, Frawley J, Hickman L, Sibbritt D. Western herbal medicine consultations for common menstrual problems; practitioner experiences and perceptions of treatment. *Phytotherapy Research.* 2018; 32(3):531-541.

5. Fisher C, Adams D, Frawley J, Hickman L, Sibbritt D. Is there a role for Western herbal medicine in treating cyclic perimenstrual pain and discomfort*? Australian and New Zealand Journal of Obstetrics and Gynaecology*. Accepted for publication 23rd July,2018.

Abbreviations

AE	Adverse event
AUB	Abnormal uterine bleeding
ALSWH	Australian Longitudinal Study on Women's Health
BMI	Body mass index
CAM	Complementary and alternative medicine
CHM	Chinese herbal medicine
CHP	Conventional health practitioner
CI	Confidence interval
CPP	Chronic pelvic pain
CPPD	Cyclic perimenstrual pain and discomfort
DSM	Diagnostic and Statistics Manual of Mental Disorders
EPO	Evening primrose oil
GABA	Gamma amino-butyric acid
GP	General practitioner
HMB	Heavy menstrual bleeding
HSR	Health Services Research
HTA	Health technology assessment
ISSP	International Social Survey Program
IUD	Intrauterine Device
NHS	National health service
NHIS	National Health Interview Survey
NICE	National Institute for Health and Care Excellence
OCP	Oral contraceptive pill
OR	Odds ratio

OTC	Over the counter
PCOS	Polycystic ovary syndrome
PH	Public Health
PMS	Premenstrual syndrome
PMT	Premenstrual tension
PMDD	Premenstrual dysphoric disorder
PRACI	Practitioners Research And Collaboration Initiative
RCT	Randomised controlled trial
SSRI	Selective serotonin re-uptake inhibitor
TCM	Traditional Chinese medicine
UK	United Kingdom
USA	United States of America
VAC	*Vitex agnus-castus*
WH	Western herbalist
WHM	Western herbal medicine
WHO	World health organisation

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Abstract

Background

There is a high prevalence of cyclic perimenstrual pain and discomfort (CPPD) with up to 97% of women experiencing problems such as premenstrual syndrome (PMS) and dysmenorrhoea, during their menstruating years. This can impair women's ability to fully participate in all aspects of life. Conventional medicine has limitations in treating affected women and evidence suggests women are increasingly exploring complementary and alternative medicines (CAMs) for support.

Aims

To determine the associated use of CAM by women with CPPD, their user-rated efficacy and the significance this use may have for public health providers.

Method

A literature review of cross-sectional data provided a baseline of CAM use, and its associated efficacy, reported by women with CPPD. Patterns of CAM use and CPPD prevalence were examined using 2012 data collected from women aged 28 to 33 years in the Australian Longitudinal Study on Women's Health. This cohorts' changes in CAM use and associated CPPD from 2006 to 2012, provided further insights into this association.

Western herbal medicine emerged as one CAM favoured by women with CPPD. Western Herbalists (WHs) were surveyed on their perceptions of their treatment for CPPD regarding its efficacy, costs and duration and the herbs preferred in treating symptoms. An assessment based on clinical evidence was undertaken for the main nominated herbs.

Results

From the literature review, cross-sectional studies of CAM use for CPPD have increased sharply in recent years, however overall data were highly variable. Across studies, CPPD prevalence was high, with a mean prevalence of CAM used as treatment of 32%

and up to 70% user-prevalence of herbal medicine. CAM efficacy was well rated, at between 33%-97%, mostly adopted through self-prescription. At least 41.2% of ALSWH participants experienced CPPD and frequent sufferers of PMS were significantly more likely to consult a naturopath/herbalist (OR = 2.11), or self-prescribe herbal medicines (OR = 1.72) compared to non-sufferers. Over the years 2006 to 2012 the only significant positive association found was for naturopath/herbalist consultations and women suffering PMS.

Between 61% and 84% of WHs rated their treatment of four common CPPD symptoms as 'always effective', this being highest for PMS. WHs' treatment appeared cost-effective and of short duration. However, scientific evidence for the main herbs used in CPPD treatment was limited.

Conclusion

CAM is increasingly being used by women to treat CPPD. Whilst herbal medicine may be an additional, effective and economical treatment, more well-designed, rigorous clinical trials are needed to confirm safety and efficacy before it gains mainstream credibility.

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1. Background

1.1 Chapter Introduction

This chapter details the aims and objectives of the thesis. To highlight the significance of the research undertaken, relevant background information is presented. First the key components of complementary and alternative medicine (CAM) and the characteristics of CAM users are described. Then the details related to common menstrual problems or cyclic perimenstrual pain and discomfort (CPPD) experienced by women, as well as the aetiology of CPPD and the current conventional approaches to its treatment are introduced.

1.2 Aims and scope of thesis research

1.2.1 Aims

The aim of this thesis is to provide a context for, and determination of, the prevalence of common menstrual problems or CPPD symptoms amongst Australian women and their associated CAM use and to explore the practice, perceptions and evidence base of a representative group of CAM health providers, specifically Western herbalists, in treating CPPD.

1.2.2 Scope of research questions

The research questions that have been posed to achieve the above aims are as follows:

1. What is the known prevalence of CPPD symptoms worldwide and what types of CAM are being used by women to deal with CPPD symptoms?

2. What is the prevalence of CPPD symptoms amongst a nationally representative group of young Australian women and which CAM practitioners, therapies and products are they using that are associated with their particular CPPD symptoms?
3. Does prevalence of CPPD in Australian women and their associated CAM use change as women age?
4. What are the perceptions and practices of Australian Western herbalists (WHs), as a representative CAM practitioner group, in treating women with CPPD?
5. How robust is the scientific evidence for core herbal medicines used by WHs in their treatment of women with CPPD?

1.3 Research approach

As of 2012 the World Health Organisation (WHO) had recorded around half of their member states as having some level of regulation applicable to CAM practitioners (WHO, 2013). Regulation of CAM practices varies with country, acupuncture for example has been regulated in around 80% of WHO member states (WHO, 2013). However, the majority of the CAM industry is unregulated in Europe (Fischer, F. et al., 2014), the UK (Thomas, K J, Carr, Westlake, & Williams, 1991) and Australia (Sibbritt, D. et al., 2018) so there are few, if any, official statistics of public utilisation of individual CAM and their application in treating health problems in these countries. The data pertaining to the prevalence of CAM therapy use are therefore almost totally reliant on those collected through observational studies. Most CAM is not clinically tested for a number of reasons, but largely because funding for such research is very limited (Wardle, J. & Adams, 2013). In addition, CAM practitioners themselves are not adequately trained in conducting research, and/or do not perceive the need for conducting research on CAM which they consider has proven efficacy by virtue of their long, traditional use (Adams, 2008; Roufogalis, 2015; Steel, Hemmings, Sibbritt, & Adams, 2015; Wardle, J. & Adams, 2013). Even without clinical evidence, however, widespread public use of CAM is well documented in

almost every aspect of healthcare today (Barnes, P. M., Bloom, & Nahin, 2009; Del Mundo, Shepherd, & Marose, 2002). The most effective way of identifying which CAM is being used, the demographics of the users and health problems for which CAM is being adopted, is through cross-sectional surveys. Data arising from public use of CAM contribute an important element of healthcare research that can be used by consumers, health professionals, health service managers and policy makers towards providing safer, relevant and more effective healthcare (Adams, 2007, 2008).

1.3.1 A Health Services Research and Public Health approach to CAM

The current 'gold standard' of medical and health-related research, the randomised controlled trial (RCT), is well suited to comparing the health outcomes associated with a single health strategy (Coulter, Lewith, Khorsan, Kirk, & Mittman, 2014; Johnson, R. B. & Schoonenboom, 2016; Verhoef et al., 2005) and as such has a place in evaluating CAM by offering some preliminary evidence of efficacy. However, the RCT design is not without its shortcomings, including the reduction to a single treatment for all people with the same overall diagnosis, failing to acknowledge the significance of the individual's real-life setting or to factor in the treatment's long-term health outcomes (Johnson, R. B. & Schoonenboom, 2016). There are, indeed, instances where RCTs have not proven to be inherently superior to observational studies in the quality of research credibility (Benson & Hartz, 2000; Concato, Shah, & Horwitz, 2000). In CAM research, where treatment protocols are individualised, the objective of the research reaches beyond group efficacy (Carter, 2003; Verhoef et al., 2005) and the practice of treating all individuals with the same protocol often runs counter to CAM's principles (Amorin-Woods, 2016; Brosnan, 2016).

The research fieldwork behind this thesis is quantitative in approach and largely based on such observational studies. Its relevance and methodology draw on aspects of a research approach that is gaining currency - Public Health (PH) and Health Services Research (HSR) - the background to which is described in section

1.3.1.1. The overall health impacts of health strategies assessed by PH/HSR take into account important matters such as access to services, affordability and quality of care rather than simply assessing the medical outcome of a health strategy (Bindman, 2013). The ultimate endpoint of the PH/HSR approach is that of achieving the best outcomes for the whole population within a greater understanding of society and individual interests (Lohr & Steinwachs, 2002).

The growing use of CAM, as well as the prevailing reliance by health providers on the need for evidence-based practice, has spawned a number of different research strategies by which the complexity that exists within CAM may satisfy the needs of its end-users as well as the required scientific demand for evidence of efficacy. The definition of evidence-based practice is more complex than that provided by RCTs, for example, some CAM practitioners have argued there is evidence-based value inherent in traditional practice (Leach, M. J., Canaway, & Hunter, 2018). PH/HSR, as outlined below, is an important research method for evaluating CAM and it, therefore, has relevance for the research that is the focus of this thesis.

1.3.1.1 Background to Public Health and Health Services Research

The field of PH and the research method behind HSR largely forms the basis of this thesis. HSR had its origins in the United States of America (USA) in the 1960s. HSR arose when that country's Association for Health Service Research recognised the need to understand more fully key elements of healthcare such as access, cost and the quality of care being delivered (Bindman, 2013). The Institute of Medicine expressed a need for a more relevant research approach to healthcare in 1995 and defined HSR as a "multidisciplinary field of enquiry, both basic and applied research, that examines the use, costs, quality, accessibility, delivery, organization, financing, and outcomes of healthcare services to increase knowledge and understanding of the structure, processes, and effects of health services for individuals and populations" (Bindman, 2013; Lohr & Steinwachs, 2002). PH shares many of the same concerns as HSR but is also focused on how the public care for themselves

(Adams, 2008), the interaction of CAM with conventional medicine and the contribution of indigenous and/or traditional healthcare to population health promotion (Adams, Sommers, & Robinson, 2013).

PH/HSR has more recently been extended to acknowledge the importance of social factors, personal behaviour and well-being, not only for the individual but the wider family, community and population as well (Lohr & Steinwachs, 2002). For those funding and responsible for delivering healthcare, there is an imperative to provide relevant, cost-effective health strategies (Bindman, 2013). This imperative has added significance today as an increasingly aging population places higher demands on health services, that are already stretched due to higher levels of chronic illness in the overall population (Vos, Barber, Bell, Salomon, & Murray, 2015). PH/HSR is a model for expediting significant findings from healthcare research into practice and policy (Bindman, 2013).

1.3.2. Health Services Research, Public Health and CAM

The broad approach to population health research encompassed by PH/HSR is an appropriate method for assessing CAM, with validity equal to RCTs for assessing individual health strategies, whilst comfortably reflecting CAM's multidisciplinary approach and concern with health promotion and prevention of illness (Hawk, Adams, & Hartvigsen, 2015; Sibbritt, D. & Adams, 2011). Its broad platform embraces research into treatments chosen by the public and their potential benefits (Sibbritt, D. & Adams, 2011), motivations for CAM choices, as well as the preference, behavioural, economic and cultural issues unaccounted for in the clinical evaluations of RCTs (Sibbritt, D. & Adams, 2011). The PH/HSR approach has been used to scientifically evaluate CAM since the beginning of new millennium (Adams, Sommers, et al., 2013). It has produced valuable health data across a number of different health issues, including women's health (Adams, Sommers, et al., 2013; Sibbritt, D. & Adams, 2011). Outcomes from the PH/HSR approach can benefit the public as well as provide

information for CAM practitioners, guide future research and inform health policy makers (Adams, Sommers, et al., 2013).

PH/HSR design methods are broad including cross-sectional, case-control and cohort studies as well as RCTs (Sibbritt, D. & Adams, 2011). The importance of PH/HSR into CAM is likely to increase with the rise in chronic health problems (Hawk et al., 2015). There is already an acknowledgment by mainstream health providers of CAMs contribution to healthcare (Adams, Sommers, et al., 2013; Coulter et al., 2014).

1.4. Conventional Medicine Definition

Conventional medicine has been variously referred to as allopathic medicine, modern medicine, orthodox medicine and biomedicine (Evangelatos & Eliadi, 2016). It is generally accepted as a system of mainstream medicine that applies pharmaceutical treatments, diagnostic procedures and surgery to all individuals within a given population (Fønnebø et al., 2007). It is premised on orthodox scientific knowledge (Bakx, 1991; Evangelatos & Eliadi, 2016) and subject to statutory regulation and in the case of pharmaceuticals to a prescribed list of scientific evaluation (Fønnebø et al., 2007). However, the therapies that constitute conventional medicine differs with time and country (Hanssen et al., 2005). Not all currently accepted conventional medicines have necessarily fulfilled all criteria required by modern validation protocols (Fedorowicz et al., 2012; Fønnebø et al., 2007; Ostuzzi, Matcham, Dauchy, Barbui, & Hotopf, 2018).

1.5 Definition of Complementary and Alternative Medicine

There have been numerous attempts to define CAM. The WHO probably providing the simplest of these, has defined CAM as those therapies that are not part of the "dominant health system"(WHO, 2004).

In 1997 the USA Office for Alternative Medicine of the National Institutes of Health, recognising the growing importance of non-conventional therapies provided this complex definition of CAM to be used also for research purposes, "Complementary and alternative medicine is a broad domain of healing resources that encompasses all health systems, modalities and practices and their accompanying theories and beliefs, other than those intrinsic to the politically dominant health system of a particular society or culture in a given historical period. Boundaries within CAM and between the CAM domain and the domain of the dominant system are not always sharp or fixed" (O'Connor et al., 1997). The overarching definition for inclusion of the broad variety of CAM was stated as including all such practices "self-defined by their users as preventing or treating illness or promoting health and well-being."(O'Connor et al., 1997) .

CAMbrella, a working group set up in 2010 by the European Community to help develop the strategy for CAM research, was also charged with the task of rationalising the existing, very diverse range of CAM therapies. They adapted the WHO definition to produce this definition for European understanding – "Complementary and alternative medicine (CAM) utilised by European citizens represents a variety of different medical systems and therapies based on the knowledge, skills and practices derived from theories, philosophies and experiences used to maintain and improve health, as well as to prevent, diagnose, relieve or treat physical and mental illnesses. CAM has been mainly used outside conventional healthcare, but in some countries, certain treatments are being adopted or adapted by conventional healthcare."(Falkenberg et al., 2012).

An extended definition, with an international perspective, comes from WHO to add to the above - that of Traditional medicine - "Traditional medicine has a long history. It is the sum total of the knowledge, skills and practices based on the theories, beliefs and experiences indigenous to different cultures, whether explicable or not, used in the maintenance of health, as well as in the prevention, diagnosis, improvement or treatment of physical and mental illnesses. The terms

complementary/alternative/non-conventional medicine are used interchangeably with traditional medicine in some countries."

Many definitions state what CAM is in the negative or in other words stating what it is not rather than what it is, which according to Coulter and Willis would not be acceptable in conventional medical disciplines and which they, therefore, dismiss as being "useless" (Coulter & Willis, 2004). Apart from the complexities of defining CAM as pointed out by Coulter and Willis, there are also issues behind the currently adopted words denoting CAM. The implication of 'alternative' medicine is as a replacement to conventional medicine, which not only overstates its role but is in any case not properly representative of the situation in that CAM is not replacing conventional medicine. Whilst 'complementary' suggests it's subordinate to conventional medicine, which also is not necessarily always the case (Coulter & Willis, 2004; O'Connor et al., 1997).

More recently some sectors of biomedical practice have brought together conventional and complementary practices in a branch of medicine entitled 'Integrative Medicine' which attempts to have 'the best of both worlds' (Adams, 2006; Maizes, Rakel, & Niemiec, 2009). The lack of consistency in the paradigms of these two disciplines makes this association an uncomfortable one as exemplified by the fact that traditional practice is the foundation of herbal medicine practice but medical practitioners are more likely driven to accept only scientifically validated herbs (Holt, 2014).

1.5.1 Definition of CAM in Australia

As a result of a nationwide recall of products from a single, natural medicines manufacturer in 2003 an expert committee on complementary medicine in the health system was convened (Australian Government, 2004). The official move was in recognition of the widespread acceptance within the Australian population of the

use of CAM. Their definition of CAM was as follows (Expert Committee on Complementary Medicines in the Health System, 2003):

> *"Complementary therapies include a diverse group of health-related therapies and disciplines that are not considered to be a part of mainstream medical care in Australia."*

According to the Australian Government's Department of Health, the following describes a complementary medicine (Australian Government, 2016):

> *"Complementary medicine means a therapeutic good consisting wholly or principally of one or more designated active ingredients, each of which has a clearly established identity and a traditional use."*

All complementary medicines are subject to the oversight of Therapeutic Goods Administration (TGA) which regulates the supply, importation, manufacturing and advertising of the goods and also ensures they meet acceptable standards of efficacy and safety (Australian Government, 2016). The TGA officially state that complementary medicines are "medicinal products containing such ingredients as herbs, vitamins, minerals, nutritional supplements, homeopathic and certain aromatherapy preparations …". Regulation of complementary medicines occurs under the Therapeutic Goods Act 1989.

The definition that best represents the CAM practices covered in this thesis is that adopted by the expert committee on complementary medicine as it relates to the Australian Health System quoted above.

1.5.2 The Background to CAM

The variety and complexity of definitions for CAM stem partly from its long historical, traditional context. Indeed, in the UK for example, until the formation of

a cohesive, professional grouping of physicians, surgeons and apothecaries in the mid 19thcentury that heralded the beginning of biomedicine as we know it today, much of healthcare practice had shared roots with traditional practice such as herbal medicine (Saks, 1999). This ‘professionalization' of medicine, favouring and granting official status, as it did for its members, created the two-tier system that persists in large parts of the Western world today - biomedicine and the ‘unofficial', mostly unregulated body of CAM practitioners. It was not until the 1960s, when CAM use had waned and become marginalised, that health consumers began seeking CAM products and practitioners in response to dissatisfaction with biomedical outcomes and/or practices coupled with a desire to exercise greater control over their health (D'Crus & Wilkinson, 2005; Saks, 1999). Numerous studies indicate that CAM is not replacing conventional medicine, with the two being used in conjunction (Kannan, Gaydos, Atherly, & Druss, 2010; Salamonsen, 2016; Thorne, Paterson, Russell, & Schultz, 2002).

Traditional CAM practices have survived. In recent times, the field of CAM has continued to evolve and new modalities/disciplines, also unregulated within the established health system, have arisen leading in part to the difficulties encountered in understanding the scope of modern CAM (Nissen & Manderson, 2013; Scott, 1999). A contributory factor in the confusion over what constitutes CAM has arisen from cultural diversity. Many countries, particularly those unable to afford modern conventional medical practices, have maintained their reliance on traditional medicine. Immigrants from these countries have then introduced their disciplines in the West (Coulter & Willis, 2004; Nissen & Manderson, 2013). A particularly successful example is that of acupuncture, mainstream in Asian countries but considered CAM in the West, which has been widely disseminated and used throughout the world (Chan, Wu, Wu, Wong, & Chung, 2017). In many Western countries, the dominant system is biomedicine, the practices and philosophies of which are taught in medical schools and sanctioned in healthcare settings. However,

even within Western countries, there is variability in the acceptance of CAM in mainstream healthcare. Germany, for instance, has integrated some CAM into their standard healthcare practice (Stange, Amhof, & Moebus, 2008) and Integrative Medicine, a blending of conventional and CAM approaches to health treatment, has become increasingly adopted within US healthcare (NCCIH, 2008). Additionally, the medical profession and professions allied to them, such as physiotherapists and nurses, have themselves adopted modified versions of CAM such as acupuncture and homeopathy but practiced within a different conceptual framework (Chua & Furnham, 2008; Nissen & Manderson, 2013; Saks, 1999).

1.5.3 The scope of CAM

Those CAM practices that are traditional, such as herbal medicine and acupuncture, have had many centuries of continuous use and importance to healthcare, particularly in developing countries where conventional medicine may be unaffordable (Coulter & Willis, 2004). Their use was considered 'unconventional' and also 'alternative' to biomedicine or conventional medicine in Western countries in the 1970-1980s (Zollman & Vickers, 1999b). The adoption of the term 'complementary' was a later reflection of the fact that both systems of medicine were being used together, though this was predominantly occurring outside of professional supervision (D'Crus & Wilkinson, 2005; Thomas, K J et al., 1991).

CAM was described by the U.S. National Centre for Complementary and Integrative Health as falling into two broad domains. The first is natural products which included herbal medicine and dietary supplements. The second is the mind-body practices such as meditation and yoga and the manipulative practices that are represented by chiropractic, massage and *Feldenkrais,* as well as combinations of mind and body therapy such as aromatherapy (NCCIH, 2008). However, this description leaves out the more difficult to define therapies like Ayurvedic and TCM,

which are whole systems of therapy and combine elements of both domains that have often formed the traditional medical practices of ethnic groups. It also ignores the 'energy' based therapies such as homeopathy and Tai-chi.

CAM has become the more commonly adopted name for these practices that fall outside of the biomedical model. But whilst the name CAM allows for inclusivity, it also blurs the nature of the enormous diversity of these therapies. The field has core elements that derive from century-old knowledge as well as new adaptations that have evolved, sometimes in settings removed from their cultural context (Zollman & Vickers, 1999b). For example, conventional health practitioners (CHPs) who employ acupuncture have dispensed with the original underlying Chinese concepts of yin and yang (Vickers & Zollman, 1999a). In the UK, Zoller and Vickers (1999) reported that in 1999 there were between 150-300 practitioner bodies for CAM, with most of these practitioners privately trained to very varying standards and that represented variable membership numbers (Zollman & Vickers, 1999b). There is a diversity of CAM spanning the full spectrum of acceptability from those that are now a part of Western health systems (such as chiropractic, osteopathy and acupuncture) to those with little scientific credibility (such as energy resonance and colour therapy). However, there are a recognised group of commonly used therapies. Apart from osteopathy, chiropractic and acupuncture, these include herbal medicine, naturopathy and homeopathy (Zollman & Vickers, 1999a).

The status of CAM today varies with geographical locations (Von Ammon et al., 2012). Retention of traditional practices occurs in poorer countries with large rural populations where this is the basis of primary healthcare because it is both cost-effective and acceptable to many as an effective treatment. In primarily Eastern cultures, such as Taiwan and Singapore, traditional practices have maintained their influence and co-exist alongside conventional medicine (Pan, Tsai, Lai, Fang, & Yeh, 2014; Tanaka et al., 2014). In the developed world CAM use, which was largely superseded by conventional or biomedicine, is continuing to witness renewed interest and strong growth. Reasons may include the rising demand for all medical practices and/or dissatisfaction with the mechanistic, conventional model and/or

the increasing interest in whole-person therapy which has gained currency in today's consumer-driven world (Coulter & Willis, 2004; WHO, 2013).

1.5.4 The new research paradigm and CAM

In spite of the diversity of CAM disciplines, many share a holistic approach to health, a belief that health is determined by physical, mental, spiritual and social factors. CAM therapies seek to enable the body to achieve balance, allowing its inherent ability to heal to be harnessed (Coulter & Willis, 2004; Zollman & Vickers, 1999b). In short, the principal focus is the individual not the disease or the symptoms of disease and therapies are used to enable the individual to achieve optimum health through a pluralistic healthcare approach.

There is acceptance from researchers across all health disciplines of the need for good quality research to improve insights into efficacy and safety of CAM (Adams, 2008; Burton, Smith, & Falkenberg, 2015). At the same time the WHO global strategy for Traditional Medicine, after consultation with experts and stakeholders, encourages member states to "harness the potential contribution of traditional medicine to health, wellness and people-centred care" and to integrate research, practice and products into healthcare (Burton et al., 2015).

As CAM treatment already gives priority to treating the whole individual, within the context of their reality, there is a strong alignment with the principles espoused by PH/HSR and that are also increasingly acknowledged as important to the biomedical model (Lohr & Steinwachs, 2002). Research into CAM is therefore comfortably accommodated within this model and PH/HSR can be used to assess CAM's contribution to multi-strategy healthcare provision without losing its underlying ethos.

In addition, it has been suggested that CAM, by being multidisciplinary, better fits the treatment of complex, chronic health problems, that are on the rise, and may

also increase client satisfaction (Burke, Ginzburg, Collie, Trachtenberg, & Muhammad, 2005). Healthcare managers have acknowledged that CAM can fill therapeutic gaps, attending to the health needs of the whole person and increasing consumer choice (Singer & Adams, 2014). These are important considerations, having increasingly greater pertinence with the projected increase in chronic ill-health, and as such has relevancy for current and future health providers (Singer & Adams, 2014).

1.5.5 CAM prevalence

The earliest survey of CAM use in the scientific literature reported a 9% prevalence of use for those using 'questionable' methods for cancer treatment in the USA in 1988 and included categories such as faith healing, diet and dietary supplements (Lerner & Kennedy, 1992).

The prevalence of CAM use has increased worldwide since then particularly in Western countries, but the extent of this growth is possibly more difficult to assess than simply surveying populations. Reasons for this include:

1. the increasing breadth of CAM modalities, the true extent of which may be missed in questionnaires employing a specified list of therapies (Clarke, Black, Stussman, Barnes, & Nahin, 2015; Nissen & Manderson, 2013);

2. the fact there are an increasing number of conventional medical practitioners employing CAM therapies (Nissen & Manderson, 2013; Von Ammon et al., 2012) and which may not be perceived as CAM by the public;

3. the ease of global migration has increased the provision of a wider variety of CAM. Increased prevalence may further reflect the demographic changes, due to migration, with the attendant use of traditional practices rather than a direct increase in acceptance and use of CAM derived from earlier surveys; and

4. people living in countries not providing State-sponsored healthcare are more likely to use CAM or traditional medicine through lack of access to conventional medicine (Barnes, P. M. et al., 2009). These are the same people who may also be less likely to be surveyed either because they are itinerant or may lack the technology or time required to participate in these surveys (Eisenberg, D M. et al., 1993).

None-the-less, comparative estimates of the change in adoption of CAM worldwide have been made. Internationally available prevalence figures of CAM use over a 12-month period from 15 countries, were reviewed from 1988 to 2011. These data are based on 30 different estimates of varying quality for both CAM therapies and CAM practitioner use. CAM therapy use was reported to be between 9.8% – 76% and that for CAM practitioner use in the range 1.8% – 48.7% (Harris, P. E., Cooper, K., Relton, C., & Thomas, K. J., 2012b). Data from the 2011-2013 International Social Survey Program (ISSP) provide the latest prevalence of use of CAM providers for 32 countries as 26.4%, with a range of 6.1% in Poland to 53.7% in the Philippines (Peltzer & Pengpid, 2016). The enormous variation is regarded as due partly to social, economic and cultural factors (Burton et al., 2015) but also to the variation in methodology of data collection (Harris, P. E. et al., 2012b; Klein, Torchetti, Frei-Erb, & Wolf, 2015).

1.5.5.1 CAM prevalence in North America

Analysis from a large 1990 survey based on a USA national database found 34% of adults aged 18 years or older had used at least one of 16 specified 'unconventional' therapies in the preceding 12 month period (Eisenberg, D M. et al., 1993). Prevalence of use was much higher than expected, based on the earlier survey, although the therapies assessed included weight-loss programs and self-help groups which though of comparatively low prevalence would not be considered, and included, in CAM prevalence surveys today.

Over a period spanning 1998-2007, Harris et al. (2012) reported that in the USA total CAM use varied from 28.9% - 54%, however, the increased use was not a function of time but of surveyor (Harris, P. E. et al., 2012b). Within the Adult Alternative Medicine survey from the National Health Interview Survey (NHIS) that specifically monitored CAM use amongst adults prevalence was at 28.9% in 1999, 32.3% in 2002, 35.5% in 2007 and 33.2% in 2012 when comparing those CAM that was consistently assessed across surveys (Clarke et al., 2015). The NHIS in 2007 confirmed a high level of CAM prevalence of use of 38.3% even though stricter criteria for CAM was used than described in 1990 – therapies omitted were prayer, weight-loss programmes and home remedies (Barnes, P. M. et al., 2009). Overall the data suggest that growth in CAM use in the USA in recent times has been slow but steady. Furthermore, from successive NHIS surveys, CAM use overall has changed little since 2002 with more marked changes having occurred within particular modalities (Clarke et al., 2015).

US CAM practitioner visits were consistently much lower than total CAM use, estimated at between 8.3% and 19.5% from the years 1990 to 2007, again showing no time-related association (Clarke et al., 2015; Cooper, Harris, Relton, & Thomas, 2013). The 2011-2013 ISSP CAM practitioner visit prevalence had risen to 21% (Peltzer & Pengpid, 2016). Early data found that although US users continued to use CAM therapies, they may have visited a practitioner intermittently, but that from 1990 to 1997 user visits to a CAM practitioner were more likely (Eisenberg, D. M. et al., 1998). The 2002 NHIS data were used to identify adults who had not used conventional healthcare in the preceding 12-month period. CAM use amongst this sample was at 24.8%. In a rural community, there were more than twice as many CAM users (47.3%) compared to those who visited a CAM practitioner (22%) and interestingly just over 38% used CAM for conditions for which they did not seek conventional help (Del Mundo et al., 2002). Those that indicated having higher health needs, when cost was a consideration, tended to visit CAM practitioners instead of the commonly observed preference for self-prescribed CAM therapies (Nahin, Dahlhamer, & Stussman, 2010).

Canadian total CAM use rose from 9.8% in 1979 to 14.4% in 1988 (Harris, P. E. et al., 2012b) whilst CAM practitioner use varied between 12.4% - 17% from 1994 to 2005, peaking in 1995 (Cooper et al., 2013). From a regional health survey using a large Ontario database in 2005, 12.9% of the respondents had visited a CAM practitioner in the previous 12-month period (Williams, Kitchen, & Eby, 2011).

1.5.5.2 CAM prevalence in the UK

A 1993 survey estimated CAM use in the population at 33%, and that more than 10% of respondents had consulted a CAM practitioner (Zollman & Vickers, 1999a). Estimated use of all CAM, measured in 1998, was 28.3% in the previous 12 month period with a life-time prevalence of use of 46.6% (Thomas, K. J., Nicholl, & Coleman, 2001). Harris et al. (2012) reported adult CAM use over the years 1998 – 2005, which appeared to be unchanged, ranging from 20.3% - 28.3%, but with no temporal relationship, the most recent estimate for 2005 registering 26.3% (Harris, P. E. et al., 2012b). Detail from a 2001 survey recorded 22.1% of adults had purchased either homeopathic or herbal medicine in the previous 12 month period (Thomas, K. J. et al., 2001).

UK surveys have reported CAM practitioner visits ranging from 2.6% of the adult population in 1986 to 12.1% in 2005 with the highest recorded visits of 13.6% in 1998 (Harris, P. E. et al., 2012b; Thomas, K. J. et al., 2001). In 1998 CAM practitioner visits in England were recorded by 10.6% of the survey sample (Thomas, K. J. et al., 2001), which was not much different to the 10% recorded for UK population surveyed in 2001 (Thomas, K. & Coleman, 2004). ISSP prevalence for practitioner visits for the 2011 - 2013 period was considerably higher at 23.6% suggesting this use has indeed grown (Peltzer & Pengpid, 2016).

1.5.5.3 CAM prevalence in Western Europe

Surveys in Scandinavian countries have largely concentrated on CAM practitioner use. In Norway, individuals themselves mostly pay for CAM practitioners. Prevalence of use was relatively static, being 9.4% in 1997 and 8.7% in 2002. However, use trended upward in 2008 with 13.1% of the adult population having visited a CAM practitioner in the previous 12-month period (Kristoffersen, Stub, Salamonsen, Musial, & Hamberg, 2014; Steinsbekk, Rise, & Johnsen, 2011), which increased to 18.2% in 2017 (Peltzer & Pengpid, 2016). As CAM is also delivered within the healthcare system in Norway, it is possible practitioner prescribed CAM is much higher, with a 2007 national survey of all CAM practitioner use from both inside and outside the health system recorded at a high level of 48.7% (Fønnebø & Launsø, 2009). Total CAM including both professional visits to providers outside of the healthcare system and self-prescribed CAM was estimated at 33% in 2007/8 for the previous 12 month period (Kristoffersen et al., 2014).

Between the years 1987-2000 CAM practitioner visits in Denmark ranged from 10% - 21% of the population (Harris, P. E. et al., 2012b) and was 23.5% between 2011 - 2013 (Peltzer & Pengpid, 2016). Whilst there are limited data available for Sweden a 2000 survey recorded CAM practitioner visits at 20% (Harris, P. E. et al., 2012b) and prevalence of visits was relatively unchanged at 19.3% in the period 2011-2013 (Peltzer & Pengpid, 2016).

In Germany, some CAM is an integral part of conventional medicine and CAM practitioners are therefore not its sole purveyors (Stange et al., 2008). In West Pomerania, Germany, a 1997-2001 survey into CAM practitioner use was recorded at a low 6% (Harris, P. E. et al., 2012b). The ISSP data, 2011-2013, for Germany showed the prevalence of practitioner visits at 19.3% over a 12 month period (Peltzer & Pengpid, 2016).

In Switzerland, some CAM therapies have been government funded and in 2007 and 2012 federal surveys of any CAM use this was estimated at 24% and 25%

respectively for those aged 15 years or older (Klein et al., 2015). Data from the ISSP 2011 - 2013 recorded this prevalence of use at 22.0 % (Peltzer & Pengpid, 2016).

Amongst older adults in Padua, Italy CAM use was measured in 1996/7 and found to be 29.5% although the sample was relatively small (Buono, Urciuoli, Marietta, Padoani, & De Leo, 2001) and nationally from the 2011-2013 ISSP data Italian practitioner visits were lower at 15.8% (Peltzer & Pengpid, 2016).

The ISSP survey, conducted over the period 2011 - 2013, covered a number of western European countries prevalence of use of CAM practitioners and these ranged from a low of 14.6% for Portugal to a high of 35.4% in France (Peltzer & Pengpid, 2016).

1.5.5.4 CAM use in other countries

There are few surveys of CAM use within Eastern Europe. A 2001 survey in the old Soviet Union estimated CAM prevalence of use, based on alternative or folk remedies, varied across states from 3.5% to 25%, possibly being a function of the health policies in each State (Stickley et al., 2013). The 2011 - 2013 ISSP provides data for a number of countries from this region and practitioner visit prevalence is generally lower than for western Europe with levels ranging from 6.1% in Poland to 20.1% in the Czech Republic (Peltzer & Pengpid, 2016).

Israeli CAM practitioner visits in the review by Harris et al. (2012) for the years 1993, 2000 and 2003 was 6.1%, 9.8% and 5.8%, respectively (Harris, P. E. et al., 2012b). Prevalence of CAM practitioner visits was 12.1% in 2007 (Shmueli, Igudin, & Shuval, 2011) and according to 2011 - 2013 ISSP had risen significantly to 24.9% (Peltzer & Pengpid, 2016).

In countries where CAM is culturally still part of the health system the prevalence of use is, as expected, much higher - 55.6% in 2004 in Malaysia, 67.8% in Saudi Arabia

in 2003, 74.8% in 2006 and 50.3% according to the ISSP 2011 - 2013 in South Korea, 76% in Singapore in 2002 and 76% in Japan in 2001 (Harris, P. E. et al., 2012b). Japanese prevalence of CAM-practitioner use in 2011-2013 was 30.4% (Peltzer & Pengpid, 2016). In China, the use of over-the-counter (OTC) self-healthcare has, according to government data been increasing. It was measured in six major cities where prevalence was 36.9% for Chinese herbal medicines (Chung et al., 2016) and 51.7% for visits to Chinese herbalists (Chung et al., 2013) in the preceding 12 month period. The ISSP prevalence of practitioner use in mainland China was 53.0%, 34.6% in Taiwan and 53.7% in the Philippines (Peltzer & Pengpid, 2016). The 2011 - 2013 ISSP also provided data for prevalence of practitioner use for Turkey (22.3%), Chile (22.1%) and South Africa (24.0%) (Peltzer & Pengpid, 2016).

1.5.5.5 CAM prevalence in Australia

Australian estimates of CAM use are the highest reported for a Western country. Data show an increasing prevalence of use with time, ranging from 48.3% - 68.9% total CAM use and 20.3% - 44.1% CAM practitioner use from 1993 to 2005 (Harris, P. E. et al., 2012b; MacLennan, Myers, & Taylor, 2006; Xue, Zhang, Lin, Da Costa, & Story, 2007). The latest data for prevalence of practitioner use measured in 2011 – 2013 ISSP were lower at 34.7% (Peltzer & Pengpid, 2016).

The distribution of CAM users across Australian states, according to a 2005 survey, did not differ significantly although New South Wales had the highest proportion of users, followed by Queensland, Victoria, Western Australia and South Australia (Xue et al., 2007). Regionally, a Queensland Social Survey conducted in 2012 estimated total prevalence of CAM use at 79% in the preceding year (Thomson, Jones, Browne, & Leslie, 2014a). In South Australia, a 2004 Health Omnibus survey indicated a prevalence of total CAM use of 52% compared to 48.5% in 1993.

Regarding prevalence of CAM practitioner use, based on data collected in 1996 it was 20.8% (Adams, Sibbritt, Easthope, & Young, 2003), in 2004 it was 26.5%

(MacLennan et al., 2006) and in 2005 it was 27.3% (Xue et al., 2007). Whilst data from the Whyalla region of South Australia estimated the overall prevalence of CAM use to be lower than elsewhere in Australia, at 32%, the CAM practitioner use was in line with other data at 27% (D'Onise, Haren, Misan, & McDermott, 2013). However, this latter survey used a very restricted list of CAM practitioners in their enquiry and this may have contributed to the lower recorded total CAM prevalence (D'Onise et al., 2013). It did, however, highlight that amongst regular CAM users 43% regularly visited 2 or 3 different CAM practitioners (D'Onise et al., 2013). From a suburban Adelaide survey undertaken in a CAM clinic, 72% of participants had been seeing a CAM practitioner for more than 12 months (D'Crus & Wilkinson, 2005).

The above data serve to highlight the inconsistencies and broad spread in prevalence estimates whilst at the same time clarifying the general trends. Firstly, the countries in which traditional medical practice has retained an official status have a very high prevalence of use. Secondly, of the English-speaking countries, Australian CAM use is significantly higher according to reported surveys. Finally, total CAM use is invariably higher than CAM practitioner use indicating CAM use is more frequently self-prescribed and not professionally overseen (Eisenberg, D M. et al., 1993).

1.5.6 Demographics of CAM users

Age appears to be a factor in CAM use with a significant proportion of users falling in the mid-age range 30 - 59 years old (Barnes, P. M. et al., 2009; Clarke et al., 2015; Klein et al., 2015; MacLennan et al., 2006; Steinsbekk et al., 2011; Thomas, K. & Coleman, 2004; Thomas, K. J. et al., 2001; Wiles & Rosenberg, 2001; Williams et al., 2011; Xue et al., 2007), although younger age groups may be increasing their uptake of CAM (Steinsbekk et al., 2011). With aging CAM use appears to diminish (Klein et al., 2015; Upchurch & Chyu, 2005).

In Western countries, those of White race, but also indigenous Americans in the USA, were more likely to use CAM than Asians or African Americans (Barnes, P. M. et al., 2009; Clarke et al., 2015; Eisenberg, D M. et al., 1993). US and Canadian surveys suggest those born in their respective countries were higher consumers of CAM than residents originally from elsewhere in the world (Upchurch & Chyu, 2005; Wiles & Rosenberg, 2001). An early survey in US, using the Medical Expenditure Panel Survey, examined CAM use by ethnicity. It found differences in attitudes to CAM, where non-Hispanic Whites and Asians viewed CAM as a 'complementary' approach to healthcare and other racial groups view was that CAM was more 'alternative' in nature (Tom Xu & Farrell, 2007).

Educational status is also commonly associated with the choice to use CAM, use being higher in those who have achieved a higher education level (Barnes, P. M. et al., 2009; Eisenberg, D M. et al., 1993; Klein et al., 2015; Nahin et al., 2010; Shmueli et al., 2011; Upchurch & Chyu, 2005; Williams et al., 2011). In contrast to this, surveys from central Norway in 1997 and 2008 found a university education was associated with less use of CAM practitioners than mid-level education (Steinsbekk et al., 2011). However, a 2007/8 survey in Northern Norway suggested that higher education in women, but not men, was associated with increased uptake of CAM practitioners and self-prescribed CAM products and/or therapies (Kristoffersen et al., 2014). This inconsistency may represent a regional variation within Norway or possible methodological or sample discrepancies that were acknowledged in these studies (Kristoffersen et al., 2014; Steinsbekk et al., 2011). The ISSP data, 2011-2013, representing 32 very diverse countries also suggests that overall, higher CAM practitioner use exists amongst those with lower education levels (Peltzer & Pengpid, 2016).

An early study by Eisenberg et al. (1993) suggested health insurance status was unrelated to the use of unconventional medicine (Eisenberg, D M. et al., 1993). More recently though, a lack of affordable conventional healthcare prompted US citizens to preferentially use CAM (Barnes, P. M. et al., 2009; Nahin et al., 2010). Participants with private health insurance or no health insurance were more likely

to use CAM than those with State-sponsored health insurance (Barnes, P. M. et al., 2009; Klein et al., 2015; Upchurch & Chyu, 2005). Over 32 countries surveyed for CAM practitioner use, this was significantly lower amongst those with health insurance (Peltzer & Pengpid, 2016).

As may be expected, there is a higher use of CAM practitioners amongst those with a higher income, however this may be a feature of countries where the cost of these visits is borne by users themselves (Johnson, P. J., Jou, Rhee, Rockwood, & Upchurch, 2016; Kannan et al., 2010; Upchurch & Chyu, 2005; Williams et al., 2011). Williams et al. (2011) also suggest people with higher levels of income and education are more likely to have access to resources with which to inform themselves of CAM options as well as having the ability to pursue them (Williams et al., 2011).

Marital status has a controversial bearing on CAM use. In North America some surveys have identified divorced/separated people as having higher levels of CAM use than those that were married or single (Oldendick et al., 2000; Williams et al., 2011). Whilst according to the 2007 National Health Statistics report respondents who were widows or widowers were the lowest users of CAM compared to the other marital status groups who were more or less equally using CAM (Barnes, P. M. et al., 2009). Amongst Norwegian men, widowers were greater users of all types of CAM compared to men from other marital status groups (Kristoffersen et al., 2014) whilst divorced or separated women were greater CAM users compared to single, partnered/married and widowed women (Kristoffersen et al., 2014; Steinsbekk et al., 2011). Yet another survey identified that amongst all Norwegians those who were divorced or separated were more likely CAM users than those in other marital status groups (Steinsbekk, Adams, Sibbritt, Jacobsen, & Johnsen, 2007). Some surveys on specific types of CAM found an association between their use and marital status, for example, higher Chinese herbal medicine use was associated with married older people in Singapore (Ng, Tan, & Kua, 2004) than other marital status groups.

It is well established that people with chronic health problems*, those with a low health status or health conditions that had poor resolution with biomedicine were also higher CAM users (Barnes, P. M. et al., 2009; Eisenberg, D M. et al., 1993; Klein et al., 2015; Kristoffersen et al., 2014; Nahin et al., 2010; Steinsbekk et al., 2011; Williams et al., 2011). In addition, there seems to be a positive correlation between chronic ill-health and multiple CAM use (Falci, Shi, & Greenlee, 2016) and between CAM use and the use of other health practitioners including those from conventional medical services (Sirois, 2008; Steinsbekk, Rise, & Aickin, 2009).

The most "bothersome or serious" conditions identified by respondents to Eisenberg et al. 1993 survey for which CAM had been used were, in descending order, back problems/pain, allergies, arthritis, insomnia, strains or sprains, headache, high blood pressure, digestive problems, anxiety and depression. Amongst those that had visited their doctor for their health problem, 28% also used CAM, 11% had visited a CAM practitioner, 4% had only visited a CAM practitioner and a third had not sought help at all (Eisenberg, D M. et al., 1993). Musculoskeletal discomfort such as back pain and arthritis are still a common predisposing factor for CAM use (Barnes, P. M. et al., 2009; Thomas, K. J. et al., 2001). So too are anxiety, insomnia, headaches, chronic pain, sprains and strains (Barnes, P. M. et al., 2009; Del Mundo et al., 2002; Eisenberg, D M. et al., 1993).

The more recent NHIS surveys found CAM use was higher amongst respondents who had more medical problems and a higher level of doctor visits (Barnes, P. M. et al., 2009; Sirois, 2008), although CAM use appears to vary somewhat with the prevailing health condition (Sirois, 2008). People suffering from chronic diseases like diabetes, arthritis, inflammatory bowel disease and multiple sclerosis have

* defined as “conditions that last a year or more and require ongoing medical attention and/or limit activities of daily living”) (Warshaw, 2006)

relatively high levels of CAM use of between 26% - 66% (Sirois, 2008). The concurrent use of CAM with conventional medicine is also apparently associated with the existing health problem. Whilst only 12% of hypertensive people used CAM and conventional medicine concurrently this practice was much higher for people with chronic pain (34%), depression (35%) and anxiety (45%) (Eisenberg et al., 1993).

Healthy lifestyle factors, such as taking regular exercise and not smoking, are also related to higher CAM use (Kannan et al., 2010; Steinsbekk et al., 2011). In line with CAM being a part of a lifestyle choice, some surveys have identified that CAM was being used to maintain health rather than necessarily treating a health problem (Kannan et al., 2010; Nahin et al., 2010). In the USA, the 2009 NHIS survey found 20% of people had chosen to use CAM in the absence of any health problems (Barnes, P. M. et al., 2009). While in England this was the case for 5% of people surveyed in 1998 (Thomas, K. J. et al., 2001).

Within urban/rural settings the variation in CAM use has been inconsistent in surveys. Some have found a higher use amongst rural residents (Herron & Glasser, 2003; Stickley et al., 2013) whilst others found no difference in overall prevalence of use of CAM practitioners or self-prescribed CAM (Oldendick et al., 2000; Williams et al., 2011). Furthermore, the type of CAM used may vary with this demographic, for instance, homeopathy and naturopathic consultations were more likely to be used in rural areas of Ontario (Williams et al., 2011). Accessibility to CAM practitioners across the urban/rural divide is likely to be a contributing factor (Meyer, 2012; Williams et al., 2011). However, surveys do suggest that rural living is associated with a higher use of CAM practitioners. Possible reasons are a lack of accessible conventional care, a higher level of chronic health problems, greater dissatisfaction with conventional care or that CAM is relatively cheaper, particularly when self-prescribed (Del Mundo et al., 2002; Herron & Glasser, 2003; Stickley et al., 2013; Wardle, J., Lui, & Adams, 2012).

1.5.6.1 Demographics of CAM users in Australia

In Australia CAM user demographics largely reflect those gleaned worldwide. The majority of CAM users were within an age band of 25 - 44 years old, CAM use dropping off beyond the age of 54 years (MacLennan et al., 2006; Spinks & Hollingsworth, 2012; Thomson, Jones, Browne, & Leslie, 2014b; Xue et al., 2007). Those in the age range 35 -54 years were the highest users of CAM practitioners (MacLennan et al., 2006).

Australian born respondents were identified as higher users of CAM than residents who had immigrated from other parts of the world (MacLennan et al., 2006; Xue et al., 2007). This practice may be especially true of CAM practitioner use rather than self-prescribed CAM (Xue et al., 2007).

Those with a higher level of education (Adams et al., 2003; D'Onise et al., 2013; MacLennan et al., 2006; Spinks & Hollingsworth, 2012; Thomson et al., 2014a; Xue et al., 2007), higher income (D'Onise et al., 2013; MacLennan et al., 2006; Xue et al., 2007) and access to private health insurance (Spinks & Hollingsworth, 2012; Xue et al., 2007) were still the predominant CAM users.

Marital status was again an inconsistent predictor of CAM use, there being no association found in a survey of women (Adams et al., 2003) and lower CAM use amongst separated or divorced respondents of both genders in South Australia in 2004 (MacLennan et al., 2006).

Healthy lifestyle choices such as not eating fast food, taking regular exercise and not smoking, as well as having some degree of spirituality, were associated with CAM users (Thomson et al., 2014b). Health maintenance was also a motivation for Australians' choice to use CAM (MacLennan et al., 2006).

Urban residence was predictive of CAM use amongst South Australians (MacLennan et al., 2006) however, non-urban residents were more likely CAM users than those

living in urban areas nationally (Adams et al., 2003; MacLennan et al., 2006). There may be an urban/rural difference in preference for types of CAM, if not in total CAM use (Adams et al., 2011; Xue et al., 2007). The geographical spread of practitioners though is a controlling factor in the choice of CAM modality used (Adams, Sibbritt, et al., 2013). In addition, the concurrent use of CAM and conventional medicine was higher in metropolitan Australia according to the South Australian Omnibus survey (MacLennan et al., 2006).

Poor health status, multiple health problems (Adams et al., 2003) and chronic health problems (D'Onise et al., 2013), especially mental health issues (Spinks & Hollingsworth, 2012), also appears to increase CAM use in Australia. CAM is being used to some extent to complement conventional treatment (Thomson et al., 2014a). The Queensland Social Survey found that neither age nor the presence of chronic health problems were significant predictors of CAM use, contrary to many other studies' findings (D'Onise et al., 2013; Thomson et al., 2014a). However, this latter study had a relatively small sample size and was predominantly focused on psychosocial factors associated with CAM adoption.

In South Australia, around 5% of interviewees from a small survey indicated they used CAM practitioners primarily, rather than seeing a conventional medical practitioner (D'Crus & Wilkinson, 2005). This use of CAM without visiting a conventional medical practitioner was slightly higher than the 1.7% - 4.4% found in the 2002 NHIS US survey (Nahin et al., 2010).

1.5.7 Types of CAM used

There are variations by country and over time in preferred modalities. CAM definitions, government funding practices, changes in attitude towards CAM, social and health environments and accessibility of CAM are all likely to be influential in the reported changing levels of popularity of the type of CAM chosen by the public. Massage therapy use, for example, may have increased to meet the needs of an

increasingly stressed population (Westman & Blaisdell, 2016) and joint problems associated with modern sedentary lifestyles may be responsible for increased visits to manual therapists (Ndetan, Bae, Evans Jr, Rupert, & Singh, 2009). Invariably surveys show one consistent trend and that is that self-prescribed CAM is much more prevalent than practitioner-based CAM (D'Onise et al., 2013; Nahin et al., 2010). Cost is likely to be a determining factor, but health status seems to be influential with less problematic health leading to lower levels of practitioner-based CAM use (Nahin et al., 2010).

A worldwide review of the 12-month prevalence of use by the general population, of a limited number of CAM practitioners from 1993 to 2007, found this to be between 0.6% - 2.8% for acupuncturists (highest for Australia), 0.4% - 2.3% for homeopaths (highest for Canada), 0.2% - 2.4% for osteopathy (highest for UK), 1.6% - 16.7% for chiropractic (highest for Australia) , and 0.8% - 1.9% for Western herbalists (highest for Australia) (Cooper et al., 2013). However, the study acknowledged that the data was of poorer quality regarding osteopath and Western herbalist use compared to that available for the other modalities.

1.5.7.1 Types of CAM used in North America

In the USA, age and health status appear to influence CAM choice. According to one of the earliest surveys, conducted in 1990, the most commonly used CAM then were relaxation therapists, chiropractors and massage therapists and 64% of CAM therapies used were self-prescribed (Eisenberg, D M. et al., 1993). In the rural south of the USA 'personal therapies' comprising home remedies, herbal therapy, vitamins and homeopathy (undefined whether self-prescribed or practitioner-based), followed by relaxation therapies which included massage therapy were the most favoured CAM (Oldendick et al., 2000). In the rural north, a survey conducted in 2000 in a medical clinic, identified the most used CAM were chiropractic, relaxation techniques, herbal medicine and massage, chiropractic and massage

therapists being those CAM practitioners that were most accessible (Del Mundo et al., 2002).

The large and more recent NHIS surveys, conducted in 2002, 2007 and 2012, noted in all three timeframes non-vitamin, non-mineral natural product use (these included herbs, enzymes and oils such as flaxseed), deep breathing techniques, osteopathy/chiropractic and meditation were amongst the five most frequently used CAM therapies. Their user prevalence levels had remained steady over time (Clarke et al., 2015). Yoga, Tai chi and Qi gong, also amongst the top five CAM used, saw prevalence levels rise steadily across the three surveys (5.8% to 10.1%) (Clarke et al., 2015; Falci et al., 2016). Acupuncture and naturopathy though at low prevalence of use (1% or less), were also increasingly used over the survey period (Clarke et al., 2015). Non-vitamin, non-mineral dietary supplements at 17% - 19% user prevalence has been the most used CAM across these surveys, 2002 - 2012, with particular increases noted in the use of fish oils, pre- and pro-biotics (Clarke et al., 2015).

The 2012 NHIS survey was analysed for patterns of CAM use amongst adults of 50 years and over. The most popular CAM used, whether to treat a health issue or for the 85% whose objective was staying well, were herbal medicine (19%), chiropractic (9%), massage (7%) and yoga (6%). However, amongst this group, those with a health issue favoured chiropractic, herbal medicine, massage and acupuncture, whilst meditation and yoga replaced chiropractic and acupuncture as the most popular CAM when it came to using CAM for maintaining ‘wellness' (Johnson, P. J., Jou, J., et al., 2016). Where health problems were prevalent and chronic the favoured therapies were herbal medicine, nutrition and spiritual healing (Tom Xu & Farrell, 2007).

In Ontario, Canada, in 2005 CAM practitioner use was considerably higher for massage therapists than for other CAM practitioners surveyed. Whilst homeopaths and naturopaths were favoured by women and rural residents, the less frequently consulted acupuncturists were preferred by men, those over 50 and urban residents

(Williams et al., 2011). In the 1996-7 Canadian National Population Health Survey chiropractors were the predominant CAM providers, used by 8.1% of the public, compared to 4.8% for any other type of CAM practitioner (Wiles & Rosenberg, 2001). Chiropractic visits at the time of the survey were covered by health insurance in some parts of Canada and chiropractors were relatively more accessible than other CAM practitioners across rural and urban areas, possibly explaining this great disparity (Wiles & Rosenberg, 2001).

1.5.7.2 Types of CAM used in the UK

Surveys from a variety of sources have gauged the popularity of different CAM therapies from 1984 to 1993. With near consistency, the same top five have been acupuncture, Western herbal medicine, osteopathy, chiropractic and homeopathy (Zollman & Vickers, 1999a).

Thomas et al. (2001) have synthesised data from a 1998 England-based survey which enquired into a limited number of CAM described at the time as ‘established'. They provided prevalence of use of practitioners in the previous 12-month period. In descending order these were osteopathy (4.3%), chiropractic (3.6%), aromatherapy (3.5%), acupuncture (1.6%) and practitioner use of Western herbal medicine and homeopathy (around 1.0%) (Thomas, K. J. et al., 2001). As reported previously, OTC use of homeopathy and Western herbal medicine was considerably higher at 8.6% and 19.8% respectively. A 2001 national survey identified the top provider-based CAM therapies used were chiropractic, acupuncture, massage, osteopathy, homeopathy, aromatherapy and reflexology. However, these were used by less than 2% of the sample (Thomas, K. & Coleman, 2004). Regionally, a southern England survey published in 2000, which included 39 different CAM therapies, registered the highest use for aromatherapy (50%), massage (61%), relaxation (50%) and herbal medicine (36%) (Furnham, 2000).

1.5.7.3 Types of CAM used elsewhere in the world

In Norway, various CAM therapies are provided within the government-funded healthcare system and by practitioners outside of the system (Fønnebø & Launsø, 2009; Steinsbekk et al., 2011). Irrespective of the source of the provider the most used therapies according to a 2006-7 survey, listing eight CAM modalities, were massage and acupuncture, with lower levels of use of reflexology, homeopathy and naturopathy (Fønnebø & Launsø, 2009). Of note is the fact that in this country chiropractic is not considered a CAM but as mainstream or conventional therapy (Steinsbekk et al., 2011).

The preferred CAM practitioner-based treatment in Switzerland, as ascertained in 2012, was homeopathy, followed by naturopathy, osteopathy, Western herbal medicine and acupuncture. However, the greatest growth in visits comparing 2007 to 2012 was to herbalists with more modest increases in visits to osteopaths and homeopaths (Klein et al., 2015). It is important to note that homeopathy, herbal medicine, TCM and acupuncture are amongst CAM practices that have limited insurance cover in Switzerland when performed by a qualified medical physician. It appears though that well over half of Swiss adults have chosen additional insurance to cover non-medically delivered CAM treatment (Klein et al., 2015).

For elderly people in urban Padua, Italy, the predominant CAM used were herbal medicine (47%) and acupuncture (34%) (Buono et al., 2001). Amongst German CHPs, preferential prescribing of CAM in 2005 was for physical therapy (76%), phytomedicine (Western herbal medicine) (71%), exercise (63%), dieting and nutrition (62%) and massage (61%) (Stange et al., 2008).

1.5.7.4 Types of CAM used in Australia

Surveys have been conducted at both national and regional levels into CAM use in Australia with some quite large differences in preference. Self-prescribed CAM use,

based on one regional and one national survey, have provided variable data, possibly because of different geographical preferences as well as differences in survey instruments. MacLennan et al. (2006) reported from regional data using a questionnaire, which divided vitamins and minerals into separate categories whereas Xue et al. (2007) used national data with a single category called clinical nutrition. The extent to which these dietary supplement categories are directly comparable is uncertain. However clinical nutrition was the main CAM in 2000 (Xue et al., 2007) and vitamins were the main self-prescribed CAM for the years 1993-2004 (MacLennan et al., 2006). The latter survey reported that the second most used CAM, and that with the greatest increased use, was herbal medicine, followed by mineral supplements and aromatherapy (MacLennan et al., 2006).

The 2000 survey lists the next most used self-prescribed CAM were Western massage therapy, meditation, Western herbal medicine and aromatherapy (Xue et al., 2007). According to a survey conducted in 2008-9 in urban South Australia, the most prevalent CAM products used were fish oil, glucosamine and multivitamins (D'Onise et al., 2013).

The predominant CAM practitioners visited were massage therapists (20.0%) and chiropractors (range 14.6% - 16.7), with lower levels of visits to osteopaths (range 0.4% -3.5%), acupuncturists (range 2.1% - 7.5%) and naturopaths (range 5.7% - 6%) (Adams, Sibbritt, et al., 2013; MacLennan et al., 2006; Xue et al., 2007).

The average number of CAM practitioner visits reported nationally for all adults in 2000 was 12, with most of these involving massage therapists or chiropractors (Xue et al., 2007).

1.5.8 Motivations for using CAM

The reasons for adopting CAM are not well studied (Fischer, F. H. et al., 2014) but are likely to vary considerably across countries, within the different demographics of each country and with the health status of the individual.

Wellness - One of the recurring themes in international surveys is that many CAM users have opted to use CAM for health maintenance. Whilst this was the motivation for a minority in the UK in 1998 (Thomas, K. J. et al., 2001), analysis of all adult use of CAM in the 2007 NHIS data revealed that 55.3% of CAM users were seeking 'wellness' rather than treating illness (Kannan et al., 2010). However, 85% of middle-aged and older people in the 2012 US NIHS survey had used CAM in the previous 12 months with the objective of attaining better health, even though half of these users had a health issue as well (Johnson, P. J., Jou, J., et al., 2016).

Dissatisfaction - lack of satisfaction with conventional care is also a driver of CAM use. This may be due to either lack of access (whether due to distance, financial considerations or under-resourced services) or through poor treatment outcomes including pharmaceutical side-effects and lack of progress to well-being (Barnes, P. M. et al., 2009; Stickley et al., 2013; Thorne et al., 2002; Williams et al., 2011; Zollman & Vickers, 1999a). To quantify this, those who felt their health needs were not being met were 70% more likely to be using CAM (Williams et al., 2011).

Self-perceived Efficacy - Surveys commonly report that the effectiveness of CAM for healthcare is a motivation for its adoption. This was the reason given for 42.7% of rural US survey respondents (Del Mundo et al., 2002). Of CAM users in older age groups, 88% felt CAM was important for their health and the individual symptom improvement reported ranged from 25% - 76% (Johnson, P. J., Jou, J., et al., 2016). It has been suggested that even though there is scant scientific evidence for CAM through RCTs, benefits that are not measurable through such trials may be the motive for its use (Fønnebø et al., 2007; Reilly, 2001).

Control - The need to take control of health is another frequent reason provided for using CAM. Scandinavian cancer and multiple sclerosis sufferers, through in-depth

interviews, expressed a wish to take an active role in their treatment by seeking out CAM therapies (Salamonsen, 2016). The desire to have control over health or treatment is echoed in a number of reported surveys (Del Mundo et al., 2002; Johnson, P. J., Jou, J., et al., 2016; Salamonsen, 2016; Sirois, 2008; Thorne et al., 2002).

Complementarity - CAM appears to be viewed mostly as safe and as a 'complement' to conventional treatment (Del Mundo et al., 2002; Salamonsen, 2016; Thorne et al., 2002; Williams et al., 2011). From a Scandinavian survey, it emerged that respondents wanted to be able to discuss CAM use with their CHPs but did not always feel this was well-received (Salamonsen, 2016). Surveys also report that CAM users, by and large, do not abandon conventional medicine but use both together to meet their perceived needs (Kannan et al., 2010; Salamonsen, 2016). Indeed, those using CAM practitioner and/or self-prescribed CAM appear to also have a higher use of conventional healthcare than non-CAM users (Kannan et al., 2010; Sirois, 2008).

Recommendations - The perceived value of the source of recommendations to use CAM or quality of information on CAM supplied to respondents is also likely to be motivational in their decision to use CAM. In the UK, 10% of CAM practitioner visits are initiated through the NHS (Thomas, K. J. et al., 2001). In the USA, 20% of recommendations to use CAM arose from doctors and 20% from family members (Oldendick et al., 2000).

1.5.8.1 Motivations for using CAM in Australia

The same motivations for CAM use, as described above, have been identified in Australian surveys. There is good evidence that a majority of Australians use CAM for general health (D'Crus & Wilkinson, 2005; MacLennan et al., 2006) with nearly as many citing their use was for dietary/nutritional reasons (D'Crus & Wilkinson, 2005). According to a South Australia regional survey, those who indicated better general

health via standard assessment were possibly also higher users of CAM practitioners, although this did not imply cause or effect (D'Onise et al., 2013).

For a third of South Australians, surveyed in a CAM clinic, their motivations for using CAM was the desire for another perspective on health issues, whilst a quarter each indicated it was because they had had previous positive experiences and because they were dissatisfied with conventional medicine (D'Crus & Wilkinson, 2005). In addition, in this same survey, 65% of interviewees felt CAM practitioner visits were better than those they had with conventional practitioners and 53% visited a CAM practitioner for health counseling (D'Crus & Wilkinson, 2005). Whilst 8% had been advised to use a CAM practitioner by a medical practitioner, three-quarters were doing so on a recommendation from family or friends (D'Crus & Wilkinson, 2005). Information about using CAM nationally came mostly from family members or friends although between 23% - 33% received this information from doctors (Adams et al., 2011). Interestingly when CAM use was suggested by a medical practitioner, there was a lower likelihood of its uptake than if this was initiated through a non-medical practitioner, though the reasons for this are unclear (Thomson et al., 2014a).

Inaccessibility to conventional healthcare has been cited as a motivation for seeking CAM as well as dissatisfaction with conventional medicine (Adams et al., 2011), this latter being the reason given by 23% of men and women in South Australia (D'Crus & Wilkinson, 2005). However, a review of CAM use for headaches and migraines suggests CAM use was not predominantly associated with dissatisfaction with biomedicine (Adams, Barbery, & Lui, 2013), so this motivation may vary with the condition treated and efficacy of the relevant conventional medicine.

Other factors that emerged as important for users in persevering with their CAM treatment were improving health, having a good relationship with their CAM practitioner and feeling that treatment goals were being met (D'Crus & Wilkinson, 2005).

1.5.9 CAM use amongst women

Early CAM-use surveys suggested there was no gender difference in the adoption of CAM irrespective of the urban/rural divide (Eisenberg, D M. et al., 1993; Thomas, K. & Coleman, 2004); (Del Mundo et al., 2002). However, throughout the years of subsequent CAM-user surveys there has emerged a consistent gender difference with women the predominant CAM users (Barnes, P. M. et al., 2009; Clarke et al., 2015; Fønnebø & Launsø, 2009; Klein et al., 2015; Shmueli et al., 2011; Steinsbekk et al., 2011; Thomas, K. & Coleman, 2004; Thomas, K. J. et al., 2001; Wiles & Rosenberg, 2001; Williams et al., 2011). In 2012, Swiss women were two and half times more likely to have used CAM than men (Klein et al., 2015) and in Ontario in 2005, women comprised two-thirds of all CAM users (Williams et al., 2011). Women are also noted in some surveys to be the main users of conventional medicine (Gentry-Maharaj et al., 2017; Upchurch & Chyu, 2005).

NHIS surveys canvassing CAM use in the previous 12-month period recorded a rise in women's prevalence of CAM use from 33.5% in 1999 (Upchurch & Chyu, 2005) to 42.8% in 2007 (Barnes, P. M. et al., 2009). By comparison, the total population prevalence of CAM use in 1999 was much lower at 28.9% (Upchurch & Chyu, 2005) and was only 33.5% for men in 2007 (Barnes, P. M. et al., 2009). The more recent 2012 NHIS survey found CAM use amongst women had remained static at the 2007 level (Clarke et al., 2015). However, amongst women of 50 years or older prevalence of CAM use reached a high of 58.5% (Johnson, P. J., Jou, J., et al., 2016). Within the 2007 NHIS, data extracted for women aged 18 - 44 year old, revealed a higher prevalence of CAM use of 67% and amongst pregnant women was higher yet at 78% (Johnson, P. J., Kozhimannil, Jou, Ghildayal, & Rockwood, 2016). Regionally, a survey conducted in 2011-2012, as part of the Study of Women's Health Across the Nation, identified a very high CAM user prevalence, of more than 80% (Green, R. R., Santoro, Allshouse, Neal-Perry, & Derby, 2017).

Other Western countries mirror women's differential levels of CAM use compared to men. In 1998 according to a UK survey, 12.5% and 32.6% of women had visited a CAM practitioner and purchased a CAM product in the previous 12-month period respectively compared to the same data for men of 8.8% and 12.0% (Thomas, K. J. et al., 2001). Private CAM practitioner use measured In Norway in 1997 and 2008, revealed user-levels rose from 6.1% to 8.3% amongst men but was twice as high for women for these same years, rising from 12.2% to 16.2% of women (Steinsbekk et al., 2011). A 2007, Norwegian, national survey of total CAM practitioner use, delivered either privately or from government-funded providers, across eight different therapies estimated that 53.5% of women compared to 43% of men had visited a CAM practitioner (Fønnebø & Launsø, 2009). Furthermore, 21.6% of women compared to 13.4% of men had made four or more CAM practitioner visits within the preceding 12-month period (Fønnebø & Launsø, 2009) and 42.0% of women compared to 24.1% of men had used some form of CAM (Kristoffersen et al., 2014).

Younger women, as indicated above, have been identified as amongst those with the highest CAM use, with a significant proportion being aged between 18 - 44 years old (Barnes, P. M. et al., 2009; Clarke et al., 2015; Fønnebø & Launsø, 2009; Klein et al., 2015; Kristoffersen et al., 2014; Shmueli et al., 2011; Steinsbekk et al., 2011; Thomas, K. & Coleman, 2004; Thomas, K. J. et al., 2001; Wiles & Rosenberg, 2001; Williams et al., 2011). This age differential also emerged from the survey data for CAM professional use in a regional Norwegian study. Across all ages, 16.2% of women had visited a non-funded CAM practitioner whereas amongst women aged between 30 – 59 years of age this user level was over 18% in 2008 (Steinsbekk et al., 2011). Nationally for all types of CAM providers, state-funded or not, Norwegian women aged 15 – 39 years had a user prevalence of over 62% and were also the highest user group of both state and private CAM practitioners (Fønnebø & Launsø, 2009). However, irrespective of gender, CAM use appears to diminish with age, particularly beyond 54 years old (Barnes, P. M. et al., 2009; Klein et al., 2015; Upchurch & Chyu, 2005).

According to a Norwegian, national survey, other demographic factors may provide some variation in patterns of CAM use by gender. For example, higher CAM use was noted amongst widowers or those men engaged in hard physical activity whilst for women the presence of anxiety/depression was associated with higher CAM practitioner visits (Steinsbekk et al., 2011). Marital status too may influence CAM use in Norway with divorced or separated women recorded as higher users of both CAM practitioners and self-prescribed CAM (Kristoffersen et al., 2014). In neighbouring Sweden, single women were higher users of dietary supplements and natural remedies (Messerer, Johansson, & Wolk, 2001).

Education too may be a determinant in women's CAM use. Mid-level education in Norway was associated with higher CAM practitioner visits (Steinsbekk et al., 2011) and higher education levels associated with increased CAM practitioners and self-prescribed CAM use by women in other countries (Kristoffersen et al., 2014; Upchurch & Chyu, 2005; Wiles & Rosenberg, 2001). Income, which may be aligned to education, has proved an influence in some communities on women's CAM use, low-income women possibly substituting CAM healthcare for unaffordable conventional care and high-income earners exercising their ability to access extra levels of healthcare (Upchurch & Chyu, 2005; Wiles & Rosenberg, 2001). Health insurance cover for CAM, an obvious factor in CAM use, was higher amongst Swiss women than men (Klein et al., 2015).

Women adopt a wide range of CAM therapies differing across geographical locations. In the UK, herbal medicine and homeopathics were the most purchased OTC CAM (Thomas, K. J. et al., 2001). Whilst in US surveys, the most used CAM were spiritual healing/prayer (17.2% - 93.5%), herbal medicine (12.1% - 88.8%), diet and lifestyle (8.4%) and chiropractic (8.1%) (Green, R. R. et al., 2017; Upchurch & Chyu, 2005). Norwegian women opted mostly for massage therapy and acupuncture (Fønnebø & Launsø, 2009; Steinsbekk et al., 2011), whilst in Ontario and Switzerland, their uptake of homeopathy was high (Klein et al., 2015; Williams et al., 2011), possibly driven by its preference for use in pregnancy (Klein et al., 2015).

Naturopaths were also favoured by women in Ontario, acupuncturists being the CAM preferred by men (Williams et al., 2011).

Within countries, ethnicity may influence CAM choices. In the USA, White women were the highest CAM users followed by Black women, Asian and Hispanic women, with most users amongst those who were US-born (Upchurch & Chyu, 2005). Between Hispanic and White non-Hispanic women, the overall CAM user prevalence differed only in the choice of CAM modality (Green, R. R. et al., 2017). Within both ethnic groups over 80% of women consumed herbal medicine, with an average of six having been taken in the previous year regardless of how many prescription medicines were also currently being taken (Green, R. R. et al., 2017). After prayer, herbal medicine was the second most commonly adopted CAM (Green, R. R. et al., 2017). Body/mind therapies appear to be favoured by Black women, manipulative therapies by White women with biologically based CAM more common amongst Hispanic and Asian women (Upchurch & Chyu, 2005).

Women's reasons for CAM use, where ascertained, have been varied. From recent NHIS surveys many more women than men were using CAM for both wellness and as a treatment, although men were more likely to be using CAM for treatment only (Johnson, P. J., Jou, J., et al., 2016; Kannan et al., 2010). Women who were more financially strained or who lacked health insurance cover used more CAM (Green, R. R. et al., 2017) and a poorer health status contributed to women opting to use CAM (Kristoffersen et al., 2014; Upchurch & Chyu, 2005). More women than men also appear to suffer from chronic health problems in the USA and this is the group more likely to be using a variety of CAM (Falci et al., 2016). In particular, women with chronic health problems (Steinsbekk et al., 2011) and perceived, unmet health needs are more likely users of CAM according to a Canadian survey in 2005 (Williams et al., 2011).

Little data are available on the reasons given by women about their choice of CAM healthcare. Amongst Hispanic women, the use of herbal medicine is culturally acceptable, likely to have been recommended by a family member and not

necessarily regarded as medicine (Green, R. R. et al., 2017). Women may also feel that by using CAM, they can gain back some control of their health from the more mechanistic, biomedical approach (Thorne et al., 2002; Wiles & Rosenberg, 2001).

1.5.9.1 CAM use amongst Australian women

In surveys undertaken in 2004 in South Australia and 2005 nationally, Australian women also recorded higher CAM use than men (MacLennan et al., 2006; Spinks & Hollingsworth, 2012; Thomson et al., 2014a; Xue et al., 2007). The range for the prevalence of use of CAM was between 60.0% - 74.4% for women and 45.9% - 63.4% for men, (MacLennan et al., 2006; Xue et al., 2007). For CAM practitioner visits the prevalence was between 29.3% - 49.2% for women compared to 23.6% - 38.9% for men (MacLennan et al., 2006; Xue et al., 2007). In both surveys, the national prevalence of CAM use was higher for both genders than that recorded regionally. A consistent percentage of South Australian women, between 58.4% - 60.0% had used CAM from 1993 to 2004, compared to men's use which ranged between 42.0% - 45.9% (MacLennan et al., 2006). In 2004, the monthly CAM expenditure by women was $23.24 compared to that by men of $18.50 (MacLennan et al., 2006). More than half of women surveyed (56%) consulted more than one type of CAM practitioner and 67% had used more than one self-prescribed CAM (Adams et al., 2011), providing a good indication of just how prevalent the use of CAM is amongst Australian women.

It is notable that around half of women in one survey had taken CAM with their conventional medicine, a greater proportion than for men (MacLennan et al., 2006). However, women were also more likely to disclose their CAM use to their GPs than men, with 47.8% having done so, compared to 36.4% of men (MacLennan et al., 2006).

The CAM favoured by Australian women is again largely in line with that found in other Western countries. In South Australia chiropractors, naturopaths and acupuncturists were the most visited CAM practitioners (MacLennan et al., 2006). However, women were higher users of aromatherapy, Western herbal medicine, Western massage, energy healing and yoga (Xue et al., 2007). Herbal medicine, according to this survey was the second most used CAM amongst women, and its user prevalence had grown the most between 2000 and 2004, rising from 16.6% to 24.9% (MacLennan et al., 2006). Whilst just over 40% of women used self-prescribed vitamins this use remained static over the survey years (MacLennan et al., 2006). Women's prevalence of use for mineral supplements ranged from 10.3% to 16.0% and for aromatherapy oils from 5.2% to 16.7% (MacLennan et al., 2006). Over half of women CAM users aged 58 - 63 years in the 1996 ALSWH survey had consulted more than one CAM practitioner. Their prevalence of use was massage therapists 63.9%, chiropractors 43%, naturopath/herbalists 22.9%, meditation/yoga therapists 16.8% and acupuncturists at 15.1% (Adams et al., 2011). These same women's use of self-prescribed CAM were vitamins and minerals (80.9%), herbal medicines (40.9%), prayer/spiritual healing (24.4%) and aromatherapy (23.9%) (Adams et al., 2011). As noted above, Australian women were also higher users of conventional health services than men, with 85.2% having visited a CHP in the previous 12-month period in the 2005 survey (Xue et al., 2007) and representing 56.6% of those attending Australian GP visits in 2013-14 (Britt et al., 2014).

The age profile of women CAM users is reflective of international trends. Women aged between 25 -50 years old were the highest users of CAM practitioners and therapies/products (Adams et al., 2003; MacLennan et al., 2006; Xue et al., 2007). From the 1996 ALSWH survey women aged 45 – 50 years were the predominant CAM users with 28% uptake, whilst younger (18 – 23-year-olds) and older age (70 – 75-year-olds) groups had uptakes of 19% and 15% respectively (Adams et al., 2003). These CAM users were also more likely to be using conventional medicine (Adams et al., 2003).

The demographic features of Australian women who use CAM have been better studied than those of women elsewhere in the world. CAM use was not associated with marital status amongst women in a 1996 survey (Adams et al., 2003) but was lower amongst divorced or separated women in South Australia (MacLennan et al., 2006). The relevance of proximity to cities to CAM use has been examined. In South Australia higher CAM use was found amongst metropolitan women (MacLennan et al., 2006) but nationally in 1996 across all age groups, non-urban women were higher CAM users (Adams et al., 2003). The urban/rural difference in CAM use *per se* was not significant according to the 2009 study of women aged 58 – 63 years old, where there was a preferential use of CAM rather than a difference in overall prevalence of use (Adams et al., 2011; Xue et al., 2007). Rural women had a higher use of chiropractors than urban women which may be related to their chronic health problems. It may also reflect the high prevalence of rurally-based chiropractors within Australia and the fact that the main medical insurance scheme endorsed chiropractic when referral originated from CHPs (Adams, Sibbritt, et al., 2013; D'Onise et al., 2013). Urban women, on the other hand, were more likely to use yoga therapists or osteopaths (Adams, Sibbritt, et al., 2013).

The motivation of Australian women for adopting CAM is not a well-studied area. Women's information about using CAM according to a national survey came mostly from family members or friends although between 23% - 33% received this information from doctors (Adams et al., 2011). Inaccessibility to conventional healthcare especially that of a female doctor, high levels of chronic health problems, poor health status and community sharing of information regarding health practices were cited by rural women as motivations for their seeking CAM (Adams et al., 2011; Adams, Sibbritt, et al., 2013; Adams et al., 2003). Greater levels of dissatisfaction with conventional services and aspects of conventional care particularly in rural areas have also been expressed by women (Adams et al., 2011; D'Crus & Wilkinson, 2005).

1.6 Menstruation and Cyclic Perimenstrual Pain and Discomfort

Menstruation is a normal and natural aspect of healthy womanhood, spanning a woman's life from menarche to menopause. Menarche usually begins around age 12 years old (Lee, M. H., Kim, Oh, Lee, & Park, 2016; Nichols et al., 2006) but could possibly occur closer to 15 years of age in Asian women (Shi et al., 2016). Menopause on average eventuates naturally around the age of 50 years (Nichols et al., 2006; Shi et al., 2016). Breaks in regular cyclic menstruation occur with pregnancies, to varying degrees during lactation (Van der Wijden & Manion, 2015), as a consequence of physical or mental stress and possibly due to other more serious morbidities (Rowland et al., 2002). Most women can expect to have between 400-500 menstrual periods in their lives (Reddish, 2006). Few women will go through all these years without experiencing some level of discomfort.

Whilst normal cycles are naturally interrupted by pregnancies and breastfeeding (which can often delay menstrual cycle resumption) the problems of menstruation have grown in modern times as women experience more menstrual cycles consequent on earlier onset of menarche, delayed childbirth, fewer births and reduced periods of breastfeeding. For most women their reproductive lives span around four decades, this was on average 37.7 years in 2006 in the USA, but according to the data, the length of women's reproductive life appears to be gradually increasing (Nichols et al., 2006). Menstruation is, therefore, a regular and enduring aspect of women's lives.

1.6.1. Definitions of main CPPD symptoms

Whilst the term CPPD is at an early stage of adoption in the literature there has been much written about, and researched into, regarding the common aspects that have historically represented perimenstrual problems namely premenstrual syndrome (PMS), dysmenorrhoea, heavy and irregular periods. Because much of the published data on CPPD has been classified into these main subject areas, they will be considered under these headings to construct an understanding of this

important women's health issue. Whilst the definitions of common aspects of CPPD is by and large still being debated, the fact that symptoms are intimately linked to the menstrual cycle is undisputed. Often there is no known underlying pathology, and symptoms also extend beyond just pain to include a range of other discomforts (Sharp, Taylor, Thomas, Killeen, & Dawood, 2002).

1.6.1.1 Premenstrual Syndrome (PMS) and Premenstrual Dysphoric Disorder (PMDD)

PMS has been defined as a set of symptoms, that can include physical and/or emotional elements (Halbreich, U., 2003; Kaunitz, Rowe, & Schnare, 2008). The predominant feature of PMS is that the symptoms occur after ovulation, in the latter or luteal part of the menstrual cycle. The symptom(s) may begin any time after ovulation (which usually occurs at mid-cycle) and can last into the first two to three days of menstruation, possibly increasing in frequency and/or severity. The symptom(s) then abate(s) at the end of menstruation and only recur with the next post-ovulatory period (Halbreich, U., 2003; Taylor, 2005). The physical features that have commonly been associated with PMS are bloating, headaches and breast tenderness or mastalgia whilst the emotional symptoms are typically irritability, mood swings, anxiety and/or depression (Halbreich, U., 2003).

PMDD is considered a severe form of PMS and has been defined in the *Diagnostic and Statistics Manual of Mental Disorders (DSM*) since 1987. The burden associated with PMDD is not insignificant, being comparable to Major Depressive Disorder (Halbreich, U., 2003). The diagnosis itself is based on the criteria indicated in Table 1.1 (adapted by Yonkers et al. from the *DSM IV*). At least five of the listed symptoms must exist, including at least one mood symptom; symptoms must have been present for at least two menstrual cycles and verified as cyclical by charting their relation to menstruation; symptoms must have resulted in impaired function; and the symptoms must not be attributable to any another psychiatric disorder (Yonkers, O'Brien, & Eriksson, 2008). As many women apparently do not meet

these full criteria the main diagnostic feature of PMDD stipulated by the American College of Obstetrics and Gynecology is that PMDD is a moderate to severe form of PMS. The basis of this is at least one physical or psychological symptom that results in significant impairment and that can be identified by prospective cycle charting (Yonkers et al., 2008).

1.6.1.2 Dysmenorrhoea

Primary dysmenorrhea has been defined by Dawood as "painful menstrual cramps without any evident pathology to account for them. It refers to any degree of

Table 1.1 Premenstrual Dysphoric Disorder

• **Clinical criteria for premenstrual dysphoric disorder**
In most menstrual cycles during the past year, at least five of the following symptoms should have been present for most of the last week of the luteal phase, remitted within a few days after onset of menses, and remained absent in the week after menses. At least one symptom must be 1,2, 3, or 4:
1 Depressed mood or dysphoria
2 Anxiety or tension
3 Affect lability
4 Irritability
5 Decreased interest in usual activities
6 Concentration difficulties
7 Marked lack of energy
8 Marked change in appetite, overeating, or food cravings
9 Hypersomnia or insomnia
10. Feeling overwhelmed
11. Other physical symptoms - eg, breast tenderness, bloating
• **Symptoms markedly interfere with work, school, social activities, or relationships**

• **Symptoms are not just an exacerbation of another disorder**
• **The first three criteria must be confirmed by prospective daily ratings for at least two consecutive menstrual cycles**
Adapted from the Diagnostic and Statistical Manual IV (DSM IV) by Yonkers (Yonkers et al., 2008)

perceived cramping pain during menstruation" (Dawood, 2006). Symptoms usually begin in the first year of the onset of menstruation (Osayande & Mehulic, 2014) and prevalence peaks in women aged 20-24 years of age (Dawood, 2006). Pain is spasmodic being primarily located in the lower abdomen or pelvic region and may radiate to upper thighs or back.

Dysmenorrhoeic pain can begin hours prior to or with the menstrual flow, typically lasts between 8 - 72 hours and is usually most severe in the first 24 - 36 hours (Dawood, 2006; Harlow & Park, 1996; Iacovides, Avidon, & Baker, 2015; Osayande & Mehulic, 2014). Symptoms associated with dysmenorrhoea include nausea, vomiting and diarrhoea (Dawood, 2006).

1.6.1.3 Heavy menstrual bleeding (HMB)

The International Federation of Gynecology and Obstetrics have agreed that the older term 'menorrhagia' should be superseded by that of heavy menstrual bleeding (HMB) (Munro, M. G., Critchley, Broder, & Fraser, 2011). HMB has been defined as menstrual blood loss of more than 80ml per cycle or bleeding that lasts longer than the expected norm of 3-6 days (Marret et al., 2010). However, measuring blood loss for most women is impractical and it has been established that often the subjective estimate of heavy blood loss is not objectively evident (Fraser, McCarron, & Markham, 1984). An alternative definition has therefore been posited which is the "excessive menstrual blood loss leading to interference with the physical, emotional, social, and material quality of life of a woman" (Fraser et al., 2015). In 80% of women with HMB, there is no pathological explanation

(Beaumont, Augood, Duckitt, & Lethaby, 2007). The prevalence of HMB is expected to increase with age (Marret et al., 2010). The consequence of unchecked HMB is iron-deficiency anaemia which can have serious health impacts and consequences (Liu, Doan, Blumenthal, & Dubois, 2007).

1.6.1.4 Irregular periods

Menstrual cycle length is calculated by counting from the first day of bleeding to the start of the next bleed. The most common cycle length is 28 days (Small, Manatunga, & Marcus, 2007) but longer cycles occur more frequently than shorter cycles (Harlow, Lin, & Ho, 2000). Irregular menstrual periods vary from the normal regular cycle either because bleeding occurs outside of the normal range of 21 to 35 days or because there is an altered bleeding pattern (such as inter-menstrual bleeding or prolonged bleeding) although both situations may co-exist (Dovom et al., 2016). Between the ages of 21-37 years cycles are most likely to be regular, possibly varying, increasing in length with increasing age (Harlow et al., 2000), but many factors can affect cycle regularity (Dovom et al., 2016). These include personal factors of weight and age (Hahn et al., 2013; Hartz, Barboriak, Wong, Katayama, & Rimm, 1979), lifestyle factors such as high stress (Radowicka, Pietrzak, & Wielgoś, 2013) and low exercise levels (Hahn et al., 2013) and some pathologies like thyroid dysfunction (Sharma, N. & Sharma, 2011) and polycystic ovarian disease (Dovom et al., 2016). All of the above factors can also alter cycle length and bleeding patterns.

1.6.2 Rationale for Cyclic Perimenstrual Pain and Discomfort (CPPD)

The phenomenon of cyclical hormonal changes influencing women's sense of well-being was recognised early on by Hippocrates however not until Horney and Frank independently, in the 1930s, derived the label 'premenstrual tension' (PMT) was full recognition given to these perimenstrual changes (Richardson, 1995). Greene and Dalton later modified and widened this concept and the types of changes, re-

labeling the phenomenon ‘Premenstrual Syndrome’ (PMS), the syndrome covering a variety of physical symptoms as well as those associated with mood change (Richardson, 1995). Yet the definition of PMS has lacked consensus (Bancroft, 1995) and still does (Halbreich, U., 2003). Bancroft, who was a pioneer in the study of women’s perimenstrual issues, concluded that many women experienced mood changes as well as symptoms such as HMB and/or dysmenorrhoea (Bancroft, 1995). Indeed, he suggested that period pain may increase a woman's tendency to also experience low mood or depression. He, therefore, proposed that PMT was simply a ‘social construct' that contributed little to a proper understanding of the changes that can affect women through menstrual cycles. The simultaneous occurrence of multiple symptoms is still commonly noted when specific aspects of menstruation are being considered indicating labels such as PMS or dysmenorrhoea are not discrete entities. As an example dysmenorrhoea is frequently associated with nausea, vomiting, diarrhoea and insomnia (Iacovides et al., 2015).

CPPD was proposed as a new concept to rationalise the myriad of perimenstrual problems, in 2002, by the Association of Women’s Health, Obstetric and Neonatal Nurses (Sharp et al., 2002). Its intention was to encompass the range of changes, both symptoms and behaviour, associated with menstruation. Changes begin either with menstruation or in the premenstrual (luteal) phase of the cycle, occur up to 14 days before onset of menstruation, and possibly last a few days into bleeding before subsiding (Halbreich, U., 2003; Sharp et al., 2002). CPPD can include physical symptoms, and/or “affective” symptoms and/or behavioural changes (see Table 1.2) (Sharp et al., 2002). This definition takes into account the over 300 various, possible perimenstrual symptoms frequently described by women worldwide and represents a more complete understanding of these cyclical changes (Halbreich, U., 2003; Smith, D. R., 2008). CPPD can be complicated by the fact that symptoms can vary in frequency, severity, range across cycles and also with age. Symptoms are further influenced by other variables in women's lives including stress levels, general health and lifestyle factors such as smoking, exercise and alcohol consumption (Harlow & Park, 1996; Ju, H., Jones, M., & Mishra, G., 2014; Nagma et al., 2015; Sharp et al., 2002).

The symptoms of PMS are now a well-established as part of CPPD, although its definition and diagnosis remain problematic due to the huge range possible (Halbreich, U., 2003). Dysmenorrhoea is considered the most prevalent of CPPD symptoms and has been further differentiated into primary and secondary dysmenorrhoea (Stewart, K. & Deb, 2016). Primary dysmenorrhoea has no obvious pathology (Dawood, 2006) whereas secondary dysmenorrhoea is a consequence of other disease conditions, primarily endometriosis but may be due to the presence of fibroids, intrauterine devices or pelvic inflammatory disease (Stewart, K. & Deb, 2016). Primary dysmenorrhoea has the characteristics described for CPPD whereas secondary dysmenorrhoea can occur at any time and if it is not cyclic, and does not remit when menstruation ceases, it falls outside the definition of CPPD (Iacovides et al., 2015).

1.6.3 Prevalence of CPPD

It is widely acknowledged that for the majority of women, estimated at 80% - 97%, menstruation is problematic at some point in their lives (Halbreich, U., 2003; Milewicz & Jedrzejuk, 2006; Sharp et al., 2002; Wittchen, Becker, Lieb, & Krause, 2002). Of the 200 to 300 symptoms associated with CPPD (Halbreich, U., 2003; Taylor, 2005) around 20 are commonly reported (Halbreich, U., 2003). Dysmenorrhoea and PMS have the highest prevalence estimated at between 17% - 81% and 10% - 90% respectively (Ju, Hong et al., 2014).

PMS prevalence if based on those women who experience at least one symptom at some level of severity may be as high as 90%. However, using the American College of Obstetricians and Gynecologists definition, of at least one physical and one affective symptom in the 5 days prior to menstruation over three cycles, the prevalence is much lower at between 20% - 40% of women (Matsumoto, Asakura, & Hayashi, 2013a). Based on a meta-analysis from 17 international studies from 1996 to 2011 PMS prevalence was 47.8% (Direkvand-Moghadam, Sayehmiri, Delpisheh, & Kaikhavandi, 2014). The more severe form of PMS, premenstrual dysphoric disorder

(PMDD) has a prevalence of around 2% - 8% (Nevatte, T. et al., 2013; Sternfeld, Swindle, Chawla, Long, & Kennedy, 2002; Wittchen et al., 2002).

The prevalence of dysmenorrhoea may be as high as 90% (Osayande & Mehulic, 2014; Sharp et al., 2002) with a prevalence range quoted as being as wide as 17% - 81% (Osayande & Mehulic, 2014). It is usually a more significant issue for younger women and is more conservatively estimated to affect around 30% - 60% of women aged teens to 40 years old (Sharp et al., 2002). In a group of young women prospectively monitored over one year, 71.6% reported they had experienced dysmenorrhoea, 60% had at least one period with severe pain and 13% experienced severe dysmenorrhoea for more than half of the timeframe (Harlow & Park, 1996).

Severe dysmenorrhoea is defined variously as 'interfering with daily life or efficiency' (Weissman, Hartz, Hansen, & Johnson, 2004), causing 'activity to be inhibited, severe pain and lack of relief from analgesics' (Sundell, Milsom, & Andersch, 1990) and causing 'absenteeism from work' (Dawood, 2006). Due to this lack of a strict definition and differences across age groups its prevalence has been hard to estimate but it is reported to affect between 10% - 25% of women (Harlow & Park, 1996; Iacovides et al., 2015). In addition, it is unknown if age changes a woman's experience of dysmenorrhoea there are few studies to date that have plotted these changes (Ju, Hong et al., 2014; Weissman et al., 2004).

The other main aspects of CPPD that form the body of this thesis relate to endometriosis, heavy and irregular periods. Prevalence of endometriosis according to the 2013 Global Burden of Disease Study was 4.8% for 2006 - 2013 (Vos et al., 2015) however, the predominant symptom of endometriosis is dysmenorrhoea.

Heavy periods are also commonly referred to as menorrhagia, heavy menstrual bleeding (HMB) or abnormal uterine bleeding (Fraser, Munro, & Critchley, 2017; Kleinstäuber, Witthöft, & Hiller). A 2005 review determined prevalence rates of

HMB of between 10% - 30%, the lower levels were objectively determined while higher levels were based upon women's subjective assessments (Liu et al., 2007). More recent data published in 2009 found a prevalence of 9% - 14% when the loss was measured objectively and 4% - 52% when reported subjectively (Fraser, Langham, & Uhl-Hochgraeber, 2009).

The prevalence of irregular periods is less clear with a broad range of 6.5% - 83.3% according to a systematic review covering developing countries (Harlow & Campbell, 2004) but was self-reported at 25.6% amongst nulliparous Danish women aged 18 - 40 years (Hahn et al., 2013).

Table 1.2 Common CPPD changes/symptoms

Physical	Affective	Behavioural
Bloating	Irritability	Sugar craving
Breast tenderness	Anxiety	Anti-social/withdrawn
Headaches	Depression	Tearfulness
Fatigue	Mood swings	Insomnia/Hypersomnia
Muscle aching	Feeling overwhelmed	Aggression
Diarrhoea	Fatigue	Decreased libido
Pelvic pain/cramps	Anger	Decreased attention
Heavy bleeding	Feeling out-of-control	Changes in appetite
Nausea	Hostility	Clumsiness
Vomiting	Guilt	
Joint aches	Impatience	

Adapted from ***Sharp et al. and Yonkers et al. (Sharp et al., 2002; Yonkers et al., 2008)***

1.6.3.1 Prevalence of CPPD in Australia

Data on CPPD prevalence amongst Australian women are scant. The prevalence rate of some CPPD-related symptoms was tracked from 2000 - 2012 for a large Australian Longitudinal Study on Women's Health (ALSWH) cohort as they aged and who were aged 18 - 23 years old in 1996 at the start of the longitudinal study. This investigation indicated that PMS prevalence increased from 35% - 41%, while that of dysmenorrhoea had a higher prevalence at the youngest age at sampling and varied from 26% - 21% (Ju, H., Jones, M., & Mishra, G. D., 2014). These data included women using the oral contraceptive pill, which would have reduced the reported level of dysmenorrhoea. For most women symptoms were intermittent, neither persisting nor resolving over the period of data collection. The prevalence of CPPD for women, at some point over this study period, was 80% for PMS and 60% for dysmenorrhoea indicating the magnitude of the problem (Ju, H. et al., 2014). A 2008 telephone survey of Australian women aged 16 - 49 years in 2004-5 investigating pelvic pain recorded 71.7% of women experienced dysmenorrhoea and for 15% this pain was severe (Pitts, Ferris, Smith, Shelley, & Richters, 2008).

1.6.4 Aetiology of CPPD

The aetiology of CPPD symptoms is yet to be unravelled (Yonkers et al., 2008) although it is known to be multifactorial (Halbreich, U., 2003). Causes are likely to vary with the individual, her circumstances and biological sensitivity to changing hormone levels (Halbreich, U., 2003; Yonkers et al., 2008) as well as to genetic make-up (Yonkers et al., 2008). Factors implicated in the aetiology are as follows:

1. **Female ovarian hormone levels** - symptoms of CPPD are a function of the cyclical changes of the two predominant hormone groups associated with the menstrual cycle (Nevatte, T. et al., 2013; Yonkers et al., 2008). During normal menstrual cycles the first half or follicular phase is dominated by oestrogens but in the second half or luteal phase of the cycle, following ovulation, progesterone is dominant (Halbreich, U., 2003). The pituitary gland is integral to ovarian function and by releasing follicle

stimulating hormone (FSH) encourages oestrogen production in the ovaries which in turn feeds back to the the pituitary when oestrogen is high to switch it to secrete luteinising hormone (LH).

CPPD symptoms are absent after ovariectomy or through gonad suppression treatment but will reappear with the introduction of hormone replacement therapies such as when progesterone is given to postmenopausal women (Yonkers et al., 2008). More specifically, CPPD begins with the luteal phase at a time when progesterone should be high and subsides when the oestrogen, oestradiol, level is predominant post-menstruation. It has been suggested that CPPD symptoms are due to abnormal hormone levels. One possibility is that either oestrodiol levels are too high or levels of progesterone are too low (low progesterone levels are known to lead to higher levels of anxiety). The other possibility is an imbalance of hormonal changes associated with the function of the maturing egg follicle (corpus luteum) or LH production (Halbreich, U., 2003; Nevatte, T. et al., 2013; Yonkers et al., 2008). Anovulatory cycles where the corpus luteum is non-functional and progesterone is not produced are symptom-free.

That hormone levels *per se* are at the root of the problem is unlikely as the serum levels of both hormones are not different between women with or without PMS for example (Halbreich, U., 2003). Women with PMS do have a relatively higher frequency of lower concentration LH pulses from the pituitary compared to women with no PMS, a situation that also pertains to women under stress or suffering from anxiety and/or depression, suggesting this may be a causal link (Halbreich, U., 2003). The relationship of reproductive hormones to CPPD is complex and incompletely understood. Indeed it may be that both hormone levels are abnormal (Yonkers et al., 2008) or the hormone interaction within the individual woman is abnormal or that women with CPPD have a higher sensitivity to their hormone fluctuations (Halbreich, U., 2003; Nevatte, T. et al., 2013).

Furthermore, hormones may influence CPPD symptoms, through an established neurological link to brain biochemistry (Milewicz & Jedrzejuk, 2006). However there

is a lack of consistent evidence that symptoms are a result of hormone imbalance and no defined patterns of disordered hormone levels can differentiate between women with symptoms and those without (Richardson, 1995; Taylor, 2005). Likewise, supplementation with exogenous hormones does not produce the expected therapeutic effect (Halbreich, U., 2003; Milewicz & Jedrzejuk, 2006; Yonkers et al., 2008).

2. **Neurotransmitters** - these biochemicals must be involved in the brain's responses to menstrual cycle hormonal changes as the reproductive hormones can cross the blood-brain barrier (Yonkers et al., 2008). The effect of oestrogen on the neurotransmitters serotonin, γ-amino-butyric acid-A (GABA-A), noradrenalin, dopamine and acetylcholine is to improve mood, behaviour and cognitive function and they are likely to be involved in manifesting symptoms in PMS (Halbreich, U., 2003). Progesterone and its metabolites, by and large, act through the neurotransmitter GABA exerting an anxiolytic, analgesic and anaesthetic effect (Milewicz & Jedrzejuk, 2006). However, progestrerone metabolites, particularly pregnenolone sulphate, appear to have contradictory and complex effects on women's mood which may be dependent on idiosyncratic pathways of hormone metabolism (Halbreich, U., 2003; Milewicz & Jedrzejuk, 2006). Neurotransmitters have operational limits outside of which normal function becomes unbalanced. The complexity of one hormone and its metabolites which can influence various brain areas through binding sites are escalated by the interaction of the various neurotransmitters and there is no simple explanation of the cause and effect of these agents (Nevatte, T. et al., 2013).

   Endogenous opioids are known to decrease in the late luteal phase possibly contributing to the onset of PMS (Halbreich, U., 2003). Opioid sites, apart from affecting mood, have recently also been implicated in reproductive hormone controlling activities (Rhyu et al., 2006) adding to the complexity of the interaction of neurotransmitters and female hormones.

3. **Normal uterine contractions** - during normal menstruation uterine contractions are rhythmic and synchronised and the basal uterine tone is low (Dawood, 2006). In dysmenorrhoea either the basal tone is raised or contractions increase in frequency or strength or they may simply lack co-ordination. One or any combination of these dysfunctions may occur at the same time. The end result is oxygen deprivation in the tissues leading to pain. Reproductive hormones influence the pattern of uterine contractions as do the inflammatory biochemicals, prostaglandin $F2_{\alpha}$ and E2 and leukotrienes C4 and D4 (Dawood, 2006). These biochemicals are known to be associated with dysmenorrhoeic cramping in uterine muscle, being present in higher levels in women with dysmenorrhoea than those who do not experience menstrual cramping (Dawood, 2006; Marjoribanks, J., Ayeleke, Farquhar, & Proctor, 2015).

Prostaglandins are produced by the enzymic metabolism of arachidonic acid by one of three possible enzymes, cyclo-oxygenase-1 (COX-1), cyclo-oxygenase-2 (COX-2) and lipoxygenase. Inhibition of these enzymes has been targeted to symptomatically relieve dysmenorrhoea (Dawood, 2006; Sharp et al., 2002). The role of exogenous prostaglandins has been demonstrated by their administration which produces the same sort of uterine cramping, as well as associated nausea, vomiting and diarrhoea that accompanies dysmenorrhoea in 60% of women sufferers (Dawood, 2006). Furthermore, Dawood states that the intensity of cramping is directly proportional to the level of prostaglandin $F2_{\alpha}$. However, again the reality is likely to be more complex as this direct connection is not invariable in all women with dysmenorrhoea, therefore other factors must be instrumental in its causation and use of oral contraceptives, which are purely hormonal, reduce prostaglandin levels and reduce dysmenorrhoea (Dawood, 2006). There is furthermore a different mechanism behind prostaglandin induced dysmenorrhoea and that caused by leukotrienes, the latter being associated with muscle contractions whereas prostaglandins are vasoconstrictive, reducing tissue oxygen levels, and they also increase uterine tone (Dawood, 2006).

4. **Other mechanisms** – a variety of mechanisms have been suggested as potentially contributing to CPPD symptoms. Vasopressin for example though not universally accepted as a factor in dysmenorrhoea can cause spasmodic uterine contractions and interrupted uterine blood flow giving rise to muscle hypoxia and pain (Dawood, 2006). Also implicated are raised prolactin levels which are associated with cyclic mastalgia; thyroid abnormalities associated with women with PMS (Milewicz & Jedrzejuk, 2006; Yonkers et al., 2008); increased aldosterone activity leading to sodium and water retention; increased adrenal activity; increased renin-angiotensin activity; nutritional deficiencies (low calcium and vitamin D3); alcohol consumption and a number of other dysfunctions including hypoglycaemia and psychogenic factors which may include depression and anxiety (Kaunitz et al., 2008; Milewicz & Jedrzejuk, 2006). Many of these suggested causes could actually be the result of CPPD, the cause and effect being at this stage unclear (Milewicz & Jedrzejuk, 2006).

   The number of hypotheses that have been promulgated is perhaps testimony to the lack of clarity regarding aetiological processes (Halbreich, U., 2003; Milewicz & Jedrzejuk, 2006; Yonkers et al., 2008), which in turn may be further complicated through their interactions that result in CPPD symptoms. This complex women's issue still awaits full elucidation.

1.6.5 Significance of CPPD

Depending on the severity of their CPPD symptoms women may suffer a number of losses, which overlap to a large extent but include:

1. Loss of quality of life and well-being that encompasses not only the misery of the physical, mental and emotional symptoms (Matsumoto et al., 2013a) but losses in the ability to fully participate in all aspects of social and family life. It is estimated that between 2% - 18% of women have CPPD symptoms that are of sufficient severity to interfere with normal daily life (Halbreich, U., 2003; Halbreich, Borenstein, Pearlstein, & Kahn, 2003; Smith, D. R., 2008; Wittchen et al., 2002).

Within young women of school age, 25% reported missing social engagements (Sharma, A., Taneja, Sharma, & Saha, 2008). Research into lifestyle factors said to contribute to the prevalence of CPPD such as smoking, weight, parity and alcohol use are still controversial so that advice around these factors does not necessarily solve the problems (Iacovides et al., 2015; Sharp et al., 2002). Women have reported receiving an unsympathetic reception by the medical profession to their CPPD symptoms (Byles, Hanrahan, & Schofield, 1997; Chapple, 1999; Cox, Henderson, Wood, & Cagliarini, 2003; Domoney, C. L., Vashisht, A., & Studd, J. W., 2003a). This experience coupled with around 40% ineffectiveness of treatment (Freeman, 2010; Halbreich et al., 2006; Kaunitz et al., 2008) and/or the unacceptable side-effects of many standard, conventional approaches may add to the women's sense of loss. A significant proportion of women may be left feeling hopeless and that there is little they can do to safely ameliorate the recurring negative effects associated with what should be a 'normal' female function (Hylan, Sundell, & Judge, 1999; Nguyen, Humphrey, Kitchen, Rehman, & Norquist, 2015).

2. Indirect costs from loss of opportunity to study and attend work, through enforced absenteeism and loss of concentration, physical and/or cognitive function. Around 40% of women whose symptoms are considered to be only moderately severe still have reduced or lost participation in workplace events affecting education and career prospects (Dawood, 2006; Dennerstein, Lehert, Bäckström, & Heinemann, 2010; Milewicz & Jedrzejuk, 2006). Hylan et al. (1999) surveyed women across US, UK and France and compared their burden of CPPD. In relation to work 55% - 63% felt symptoms interfered with their ability to perform their tasks, between 8% - 16% were unable to attend work and between 10% and 29% had missed 8 or more days of work in the past year (Hylan et al., 1999). Amongst school students with menstrual problems 50% felt unable to study, 16% were unable to sleep and 26% had missed classes (Sharma, A. et al., 2008).

3. Direct costs to women are accrued through lost productivity, days off work and medical expenses. An international study has reported that women with moderate or severe CPPD lost more than 8 hours attendance at work per cycle and/or a high

impairment to their work productivity compared to women whose CPPD symptoms were mild or absent (Heinemann, Minh, Heinemann, Lindemann, & Filonenko, 2012). Apart from the costs related to the need to pay for personal healthcare products and/or medical expenses there are societal and workplace costs through absenteeism as well as costs incurred by the state through lost national income and productivity (Smith, D. R., 2008). Surveys consistently find that a majority of women do not seek either conventional medical help or use prescription medicine to treat CPPD symptoms. This reticence to seek help was true for 73% of women in the USA, 82% in the UK and 66% in France (Hylan et al., 1999), suggesting they are either enduring discomfort or paying for additional therapy out of their own pockets.

The more serious the symptoms experienced however, the more likely it is that women will seek professional medical care whether that is state or self-funded (Tanaka et al., 2014). From Japanese, US and UK data, the proportion of women who sought medical help as much as doubled when women experienced severe CPPD symptoms compared to those whose symptoms were not classified as severe (Hylan et al., 1999; Tanaka et al., 2014). Amongst women with endometriosis leg pain the rate of physician consultation was as high as 68% (Missmer & Bove, 2011).

Burden of illness data provide a useful measure to guide health policymakers in appropriate funding allocation by assessing direct health-related costs, loss of productivity and quality of life affects (Rapkin & Winer, 2009). A 2011 national study in Japan attempted to assess the burden of menstrual symptoms in a three-month timeframe amongst women aged 15 - 49 years old (Tanaka et al., 2014). The CPPD symptoms were measured using the Menstrual Distress Questionnaire, tailored to the Japanese experience and covered six domains - pain, concentration, behavioural change, autonomic reactions, fluid retention and negative affect. Of the 74% who suffered a variety of CPPD symptoms the costs including for outpatient/gynaecology visits, OTC pharmaceuticals and lost productivity was estimated to be approximately US $8.6 million annually (Tanaka et al., 2014). Based on data derived from all menstruating women sampled, gynaecology visit uptake in this survey was

20.4% and amongst those who did not utilize gynaecology services 35.0% self-treated with OTC medication (Tanaka et al., 2014).

A recent analysis of data held for young aged women cohorts, 18 - 23 year-olds, from ALSWH compared the general health for this age group in 1996 and 2013 (Rowlands, Dobson, & Mishra, 2015). Young women are apparently increasingly experiencing general health issues, particularly those associated with heavy periods, irregular periods and dysmenorrhoea. The increase seems likely to be related to increased levels of perceived stress and lifestyle factors arguably associated with this stress such as alcohol consumption, smoking and increased body weight (Rowlands et al., 2015). To what extent increased menstrual problems impinge on the sufferers' perception of their other health problems is difficult to disentangle but undoubtedly the two are intimately connected and the reach of menstrual problems in Australia is likely to increase as the levels of stress increase (Rowlands et al., 2015). All four common aspects of CPPD are likely to contribute to the losses highlighted above, however, some have been better quantified than others for their impact on women, their families and society.

Dysmenorrhoea - Dysmenorrhoea causes a high level of general disruption to daily life with absenteeism or missed activities affecting anywhere between 11% - 74% of sufferers (Harlow & Park, 1996; Patel, Tanksale, Sahasrabhojanee, Gupte, & Nevrekar, 2006; Seven, Güvenç, Akyüz, & Eski, 2014; Tariq et al., 2009). Data indicate that 21% - 30% of women had their sleep disturbed and 72% - 78% had experienced a reduced ability to concentrate (Chia, Lai, Cheung, Kwong, Lau, & Leung, 2013). Indeed dysmenorrhoea was the leading cause of recurrent, short-term absenteeism amongst school-aged girls (Sharp et al., 2002).

The costs of dysmenorrhoea were recently assessed in Japanese women seeking professional medical help using national database records of treatment patterns (Akiyama, Tanaka, Cristeau, Onishi, & Osuga, 2017). Between the years of 2009-2014, over 80% of these women received either a pharmaceutical drug (including TCM) or to a limited extent, surgery. Women with dysmenorrhoea (primary or

secondary) had over eight outpatient visits in a 12-month period and treatment costs were 2 to 3 times higher for these women than for women without dysmenorrhoea. Dysmenorrhoiec outpatient visits were estimated to cost between US$1,917 – $2,465 on average compared to the general cost for non-dysmenorrhoeic women of US$836. Dysmenorrhoea was the leading cause of the adoption of TCM treatment in Taiwan where the therapy is available through the national insurance scheme alongside conventional medicine (Pan et al., 2014).

Self-medication paid for by women, in the form of pain relief, was used by between 52% - 84% of women in treating menstrual cramps (Chia, Lai, Cheung, Kwong, Lau, & Leung, 2013; Harlow & Park, 1996; Lee, D. Y., Koo, Yoon, & Choi, 2010; Ohde et al., 2008; Seven et al., 2014). A prospective survey conducted between 2005-7 monitored medication use by women over two menstrual cycles confirming the main medication used was pain relief. Analgesics were used by 69% of women for an average of 4.8 days (range 1 - 27 days) over the two cycles. However, there was also an unexpected increased pattern of the cyclical use of antibiotics and central nervous system (CNS) medications, albeit at a much lower prevalence (Johnson, K. A. et al., 2016). All these medications never-the-less represent an increased economic burden on women due to menstruation.

HMB - Women may suffer from HMB for anywhere between three to nine years before seeking help (Liu et al., 2007). The hidden costs to women of CPPD, both in terms of lost income and quality of life, is illustrated amongst working women with HMB. Of women with HMB, 61.7% were working and 55% rated their health as excellent or very good. This rating compared to women with a normal flow of whom 73.5% were in work and 70% rated their health excellent or very good (Côté, Jacobs, & Cumming, 2002).

It is estimated that around 30% of women with HMB seek medical help during their reproductive lives (Laberge et al., 2015; Tanaka et al., 2014). HMB accounts for over 5% of 30 - 49-year-old UK women consulting their doctors each year and a further 12% of gynaecology referrals (Grant, Gallier, Fahey, Pearson, & Sarangi, 2000). The

costs of HMB have been relatively well examined over the years, possibly because it is the CPPD aspect that most often results in recourse to conventional medical care. The other main menstrual problems such as dysmenorrhoea and PMS are both amenable to self-treatment and more likely to be considered by women as outside the realm of professional treatment (Akiyama et al., 2017; Ohde et al., 2008).

In the UK, in financial terms, HMB alone has been estimated to incur £150 million in direct costs and £1.8 billion in indirect costs with investigations accounting for about 50% of those direct costs (Fraser et al., 2009). According to the 1999 US NHIS data, the annual cost of lost productivity due to HMB was put at $1,692 per woman (Côté et al., 2002). The total direct and indirect costs of HMB have been estimated at US$1 billion (GP visits and treatment) and US$ 12 billion in lost productivity (Liu et al., 2007). HMB is also estimated to be responsible for 25% - 50% of hysterectomies, this strategy being used half the time in its treatment (Liu et al., 2007).

The cost of investigation and management of HMB in Australia, in 2004, was estimated to be AU$ 6 million a year (Hickey, Karthigasu, & Agarwal, 2009). Australia has a particularly high rate of surgical hysterectomies reportedly occurring in 1 in 5 women by the age of 50 (Byles, Mishra, & Schofield, 2000; Graham, James, & Keleher, 2008; Santow & Bracher, 1992). The choice to undergo a hysterectomy in this country appears to be highly influenced by the medical profession (Graham et al., 2008) and there is a concern that many of them are be being performed unnecessarily (Higham & Reid, 1995; Liu et al., 2007). Moreover, costs related to an individual's treatment are likely to extend beyond a single therapy, with an ALSWH study identifying that women who underwent hysterectomy were also more likely to have previously received hormone therapy and endometrial ablation (Graham et al., 2008).

A systematic review looked at international data for all costs associated with uterine fibroid management, one of the leading causes of HMB (Lasmar & Lasmar, 2017). HMB therapy covers the full range of conventional treatment possible.

Treatment costs averaged out at US$9,319 - $7,473 per patient in direct costs, US$2,399 - $15,549 per patient in indirect costs and US$11,717 - $25,023 per patient per year in total costs (Soliman, Yang, Du, Kelkar, & Winkel, 2015).

PMS/PMDD - With its high level of prevalence, the impact of this aspect of CPPD is likely to be considerable (Matsumoto et al., 2013a). From a comparative study of prescribing practices in different countries it has emerged that for women who do choose to consult CHPs with PMS, 72% - 89% of them receive prescriptions, compared to 59% - 78% for all women patients whose consultations result in a prescription (Weisz & Knaapen, 2009). Women with PMDD may have 3000 days blighted throughout their lifetimes due to the severity of symptoms (Rapkin & Winer, 2009). Those women affected have also reported 2 - 6 days per month of impaired function, were five times more likely to experience impaired professional and social function compared to non-sufferers and had an average of 4 primary care medical appointments per year as well as higher use of medical specialists (Rapkin & Winer, 2009). The majority of the economic burden for women with PMDD may be due to lost productivity rather than healthcare costs or costs from work absenteeism (Chawla, Swindle, Long, Kennedy, & Sternfeld, 2002).

The costs to women, the state and health providers for treating CPPD are projected to increase with greater professional and public awareness of treatment strategies such as those currently recommended by National Institute for Health and Care Excellence (NICE) in the UK (Fraser et al., 2009). The current gynaecological advice appears to be that personalised treatment may require multiple strategies and/or pharmaceuticals (Kaunitz et al., 2008; Yonkers et al., 2008), possibly involving several different health professionals (Marjoribanks, Jane, Lethaby, & Farquhar, 2016). The calculation of both direct and indirect costs, given above, for treating these complex women's health issues is compounded by the potential need for multiple therapies to achieve the best outcomes for women. In addition whilst symptoms may not occur every cycle they can require long-term therapy (Kaunitz et al., 2008; Yonkers et al., 2008). Other potential costs have arisen from the consequences of unwanted side-effects of the initial treatment such as

complications arising from hysterectomy surgery (Marjoribanks, Jane et al., 2016; Spilsbury, Semmens, Hammond, & Bulsara, 2009). Without early intervention, however, costs to both women and the state are expected to escalate (Fraser et al., 2009).

1.6.6 Conventional treatment of CPPD

The understanding of the aetiology of CPPD symptoms, as presented in the previous section, is currently incomplete (Iacovides et al., 2015). The underlying causes are likely to involve biological, psychological, sociologic and environmental mechanisms (Kleinstäuber et al., 2012) so that conventional treatment has been largely symptomatic and *ad hoc* (Kaunitz et al., 2008; Sharp et al., 2002). Furthermore, some CPPD symptoms are complicated by being closely associated with other morbidities. For example, urinary tract infections and irritable bowel syndrome can contribute to period pain and existing depression may contribute to the manifestation of PMS. In addition, social factors such as stress could influence hormone and/or prostaglandin balance (Sharp et al., 2002).

It has been well-established over many clinical trials of treatments for various CPPD symptoms, in which a placebo arm has been included, that there is a high response rate to placebo treatment. Placebo has delivered up to a 50% improvement in symptoms irrespective of whether the active therapy has been conventional or CAM (Dawood, 2006; Kaunitz et al., 2008; Pullon, S.R., Reiken, & Sparrow, 1989; Sharp et al., 2002; Wyatt, Dimmock, Frischer, Jones, & O'Brien, 2002).

The variety of conventionally recommended treatments number over 300 to-date but include four main strategies: 1) behavioural and lifestyle changes; 2) non-prescription dietary supplements; 3) pharmaceuticals; and 4) surgery.

1. **Behavioural and lifestyle changes** such as dietary alterations have been recommended, including the consumption of more complex carbohydrates,

reduction of caffeine, salt and alcohol and increased levels of exercise and yoga (Kaunitz et al., 2008; Sharp et al., 2002). Also in this category are techniques to assist women's awareness of all CPPD-associated aspects and treatment through 'self-monitoring interventions', relaxation therapy and more formalised help such as cognitive behavioural therapy (Weisz & Knaapen, 2009) and counselling (Kaunitz et al., 2008; Sharp et al., 2002; Yonkers et al., 2008). A systematic review of the outcomes from these interventions suggests they can be helpful but data to-date are scant and considered to be of dubious quality (Proctor, Murphy, Pattison, Suckling, & Farquhar, 2007). A meta-analysis of the use of cognitive behavioural therapy to treat PMS concluded there was no benefit for behaviour and mood-related PMS symptoms and only a small improvement was achieved in reducing functional impairment (Kleinstäuber et al., 2012).

2. **Non-prescription dietary supplements** have been recommended in many countries. These include vitamin B_6, vitamin E, magnesium, calcium and essential fatty acids such as fish and evening primrose (EPO) oils. The objective outcomes for these recommendations are assessed as anywhere from 'showing an improvement' (Sharp et al., 2002; Taylor, 2005; Weisz & Knaapen, 2009) to being of inconclusive/limited benefit (Kaunitz et al., 2008; Yonkers et al., 2008). None-the-less the Royal College of Gynaecologists in 2007 were recommending the use of vitamin B_6 for severe PMS as one of a number of first-line therapies (Green, L. J., O'Brien, Panay, & Craig).

3. **Pharmaceutical** approaches are considered the most effective pathway for treating dysmenorrhoea (Dawood, 2006). In the treatment of PMS professionals have been encouraged to use changes in lifestyle, nutrition and non-pharmacological strategies as the first line of therapy. Current gynaecological advice is to take time to establish the correct diagnosis by charting symptoms over the course of 6 - 8 weeks whilst implementing preferred first-line strategies (Kaunitz et al., 2008; Yonkers et al., 2008). Charting enables confirmation of the cyclical manifestation of symptoms or may suggest further diagnostic testing to differentiate the likely underlying, causal morbidity (such as thyroid dysfunction and depression/anxiety

disorders). This clarification should then lead to the adoption of the most appropriate course of drug therapy (Kaunitz et al., 2008; Yonkers et al., 2008). Pharmaceuticals typically prescribed include:

a) Female hormone therapies predominantly the oral contraceptive pill (OCP) but also hormone-releasing intrauterine devices intended to address hormone-imbalance. They usually suppress ovulation and may also reduce prostaglandin-related uterine cramping and uterine blood flow (Wong, C. L., Farquhar, Roberts, & Proctor, 2009). Also in use are selective oestrogen receptor modulators (SERMs), which bind to oestrogen receptors sites having variable effects acting either as agonists or antagonists at different sites. By simulating menstrual cycles, with alternating female hormone substitutes, they cause shedding of endometrial lining thus resembling 'regular periods'. OCPs by inhibiting ovulation also reduce the thickness of endometrial lining with a consequent reduction in menstrual loss helping to control HMB.

   OCP use has potential benefits for the symptoms of dysmenorrhoea, though this has been deemed 'limited' according to a Cochrane Database systematic review (Wong, C. L. et al., 2009). There is some evidence that 65% of women with dysmenorrhoea have benefitted from a low dose OCP intervention (Wong, C. L. et al., 2009). OCPs may also benefit cycle irregularity and heavy bleeding (Dawood, 2006; Kaunitz et al., 2008). Benefits for PMS are less clear, with contradictory effects (Domoney et al., 2003a), but they may help if used continuously without the usual 7-day withdrawal period prior to menstruation (Kaunitz et al., 2008). OCPs are associated with side-effects ranging from the minor, such as nausea, weight gain, fluid retention and headaches, to those of a more serious nature such as depression, venous thrombosis and some reproductive and liver cancers (Jordan et al., 2015). Side-effects may be mitigated to some degree by switching to low-dose OCPs. However non-contraceptive oestrogen preparations in the form of ingestible preparations, gel, patches or sub-cutaneous implants have no solid evidence to support their

effectiveness and they may actually exacerbate symptoms for some women (Naheed, Kuiper, Uthman, O'Mahony, & O'Brien, 2017).

Progesterone therapy has been used for affective symptoms, but its efficacy is unproven (Yonkers et al., 2008). Progesterone impregnated IUDs have benefits for heavy menstrual blood loss but are associated with side-effects such as breast pain, greasy skin and acne, ovarian cysts, pelvic pain, weight gain and bloating (Lethaby, Hussain, Rishworth, & Rees, 2015). In addition, these IUDs were not as successful in treating HMB as hysterectomies. One trial that examined the long-term effect of IUDs indicated that amongst the recipients of these devices within a ten year follow-up period, 46% of women subsequently went on to also have a hysterectomy (Lethaby et al., 2015). Other hormone therapies, though considered effective, suppress the hypothalamic/ pituitary/gonad axis inhibiting menstruation and creating 'chemical' menopause with associated symptoms such as hot flushes and osteoporosis (Steiner, 2000; Yonkers et al., 2008). The important disadvantages of this treatment are they are unsuitable for women wishing to conceive and/or those with underlying health problems such as reproductive cancers or a family history of deep vein thromboses.

b) Analgesic and anti-inflammatory drugs, such as ibuprofen and naproxen, are believed to counter prostaglandins' negative effects on uterine cramping and are used with some benefit for dysmenorrhoea as a symptomatic treatment. There is no clear differential efficacy amongst the different acting drugs (Marjoribanks, J. et al., 2015) and they are not effective for all women with 20% reporting no benefit (Dawood, 2006). They also have potentially harmful side-effects on the gastro-intestinal system, nervous system, liver and kidney (Dawood, 2006; Marjoribanks, J. et al., 2015).

Mammalian studies, using animal models, have indicated non-steroidal anti-inflammatory drugs (NSAIDs) inhibit ovulation (Gaytan, Morales, Bellido, Sanchez-Criado, & Gaytan, 2006). There are very few studies clarifying the

situation for women though, with only limited information regarding potential effects of the different types of analgesics on ovulation and little clarity regarding their mechanisms for causing any cycle alteration (Matyas et al., 2015). Given that these drugs are those most commonly used as OTC treatment for dysmenorrhoea (Sharp et al., 2002) the lack of knowledge and understanding of their effect on women's fertility appears to be a serious omission in research priorities. This class of drugs may have little, or no effect on menstrual flow (Dawood, 2006; Lethaby, Duckitt, & Farquhar, 2013) and proof is lacking of their benefit for the more severe pain of endometriosis (Brown, J. & Farquhar, 2014).

Uterine smooth muscle relaxant drugs, the β2-adrenoceptor agonists normally used in asthma treatment, have been reviewed in the Cochrane Database as a treatment for dysmenorrhoea. The reviewed studies were judged to be of poor quality and the medications tested to have demonstrated limited efficacy whilst carrying significant adverse risks (Fedorowicz et al., 2012).

c) Anti-depressants are the drug treatment of choice for CPPD affective symptoms (Kaunitz et al., 2008), particularly for women with PMDD. The rationale for their use is to negate the disruptive neurotransmitter binding of serotonin and GABA potentially caused by reproductive hormones (Halbreich, U., 2003; Yonkers et al., 2008). Their use appears to provide some improvement in physical symptoms too (Yonkers et al., 2008). Selective serotonin reuptake inhibitors (SSRIs) are the most frequently recommended of these drugs. SSRIs have been estimated to benefit between 40% - 70% of severely affected women compared to a 20% - 91% improvement on placebo medication (Halbreich et al., 2006; Kaunitz et al., 2008; Kleinstäuber et al., 2012; Yonkers et al., 2008). However, any benefits for SSRIs as a treatment for PMS over the long-term are yet to be established (Kleinstäuber et al., 2012). Low-dose regular use is recommended because of potential side-effects associated with these drugs which include nausea, headaches, anxiety, weight gain, reduced libido and suicidal ideation (Kaunitz et al., 2008; Taylor, 2005).

d) Symptomatic drug regimens include: diuretics such as spironolactone, which is used to reduce fluid retention (Kaunitz et al., 2008); glyceryl trinitrate which is used to induce muscle relaxation (Dawood, 2006); benzodiazepines which are used to help with insomnia and/or anxiety although their efficacy is currently questioned and they are not only difficult to withdraw from but are also associated with undesirable side-effects such as anxiety (Apter et al., 2003; Yonkers et al., 2008); tranexamic acid, taken as needed, which is used to reduce heavy bleeding (Grant et al., 2000); and gonadotrophin releasing hormone agonists (GnRH) which block receptor sites involved in reproductive hormone release and effectively induce a medical oophorectomy with the attendant side-effects associated with menopause, and are used as a last line approach (Kaunitz et al., 2008; Yonkers et al., 2008).

   An improved level of symptom relief may be achieved through combining one or more of the pharmaceuticals such as the synthetic, steroidal progestin, drospirenone, which has diuretic properties and is also contraceptive (Apter et al., 2003). However treating symptoms alone inevitably means once treatment ceases symptoms are likely to recur (Pearlstein & Stone, 1994; Steiner, 2000). Because such treatment is not remedying the underlying problem, CPPD symptoms can persist throughout the many years of a woman's reproductive life requiring the prospect of long-term treatment with increasing potential for adverse side-effects.

4) **Surgical** interventions, usually used after other interventions have failed, these include endometrial ablation therapy, hysterectomy and/or oophorectomy (Nevatte, T. et al., 2013; Proctor & Farquhar, 2006; Weisz & Knaapen, 2009; Wyatt et al., 2002). These procedures are adopted predominantly for functional menstrual problems such as HMB, abnormal uterine bleeding (AUB), pelvic congestion and PMS (Nevatte, T. et al., 2013; Treloar et al., 1999). Removing either the whole uterus or just the uterine lining prevents HMB and AUB but has no beneficial effect on PMS.

Endometrial ablation, mainly used for HMB, has potentially adverse consequences in the form of uterine perforation, fluid overload, hematometra, and cervical lacerations (Laberge et al., 2015). Women who have this technique may require further treatment within four years - 20% will receive a repeat procedure and 9% a hysterectomy within five years - furthermore, this procedure is not an option for women who wish to retain their fertility (Laberge et al., 2015). Around a fifth of UK women recently treated by the currently advocated ablation therapies still experienced problems that lead them to undergo hysterectomy (Hussain, Barnes, & Aziz, 2016). Whilst ablation techniques are used as a first line surgical response to HMB their success rate is affected by age, older women aged 46 years or older, gaining greater benefits than those 45 years or younger (El-Nashar et al., 2009).

Excising ovaries or oophorectomy removes ovarian hormones that cause uterine changes and bleeding itself and so effectively stops PMS but precipitates menopause. Women referred to gynaecologists for HMB may make up 12% of such referrals and an estimated 60% will go on to hysterectomy (Grant et al., 2000). All of these procedures have the potential for serious consequences (Knaepen & van Calenbergh, 2015; Spilsbury et al., 2009).

Surgical interruption of nerve pathways, another potential surgical solution to deal with dysmenorrhoea has not been of any proven benefit (Proctor, Latthe, Farquhar, Khan, & Johnson, 2005). Often the use of surgical techniques will also require pharmacological support. For example, before thermal ablation, OCPs may be used to thin the endometrium and/or post-surgery analgesia is likely to be required.

1.6.7 CAM use by women with CPPD

There is now a body of evidence accumulating for the use of CAM for CPPD based on RCTs, clinical and preclinical studies. However, for the most part, reviews are critical of the methodology used in clinical trials, giving only limited support for

CAM use for CPPD issues (Dante & Facchinetti, 2011; Fugh-Berman & Kronenberg, 2003; Javan et al., 2016; van Die, Burger, Teede, & Bone, 2013).

By contrast, there are only limited cross-sectional data reporting the use of CAM by women with CPPD. CAM use has been better characterised amongst pregnant and menopausal women where the overall prevalence of use has ranged widely from 25% - 91% (Birdee, Kemper, Rothman, & Gardiner, 2014; Frawley, J. et al., 2013; Gartoulla, Davis, Worsley, & Bell, 2015; Gentry-Maharaj et al., 2017; Hwang et al., 2016; Johnson, P. J., Kozhimannil, K. B., et al., 2016; Lunny & Fraser, 2010). According to some surveys, pregnancy may not necessarily be a factor in the prevalence of CAM use, this use being high amongst non-pregnant women too (Birdee et al., 2014; Klein et al., 2015).

Studies have provided some non-specific data on CAM use and women's reproductive health. Amongst Scottish, conventional obstetric health providers 32.5% had recommended women use CAM, the recommendation being more likely if they were CAM users themselves (Stewart, D., Pallivalappila, Shetty, Pande, & McLay, 2014). Gynaecologist/obstetrician physicians in Michigan were surveyed alongside their women clients on CAM use. Unexpectedly the physicians were more positive about the role that CAM could play in women's reproductive health than their female clients and they believed a range of CAM could be up to 73.8% 'highly or moderately' effective (Furlow, Patel, Sen, & Liu, 2008). Nearly all physicians surveyed had supported some CAM use, with 86.4% recommending movement therapies, 80.3% biofeedback, 79.8% acupuncture, 78% meditation, 70.9% chiropractic and 70.1% hypnosis but less than half supported women using homeopathy, aromatherapy and bioelectromagnetic therapy (Furlow et al., 2008). Whilst 40.1% of physicians had recommended homeopathy and 64.1% herbal medicine, these were the two modalities that elicited the most safety concerns amongst these CHPs (Furlow et al., 2008). Menstrual problems and pelvic pain were amongst the most common, though not the exclusive, reasons for clients CAM use, their preferences being for herbal medicine, yoga, visualization and EPO (Furlow et al., 2008). CAM recommendation to clients came mainly from family and friends.

Although only 29% of women discussed adopting CAM with their physician, nearly 60% of these physicians were supportive and encouraged women to continue to use CAM (Furlow et al., 2008).

CPPD is a common presentation at CAM clinics from the limited data available. An analysis in 2002 by the British Acupuncture Council established that 74% of acupuncture clients were women, mostly aged 25 years – 54 years old, 5% of whom were specifically attending for female-related problems. Those under 55 years-old were nearly seven times more likely to be attending for these reasons (MacPherson, Sinclair-Lian, & Thomas, 2006). PMS was also reported by WHs in the UK in 1998 to be the second most common complaint treated by them (Barnes, J. & Ernst, 1998).

Although no detail is available, in 2000, of those attending US rural health clinics, 5.4% of CAM users were doing so for obstetric or gynaecological reasons (Del Mundo et al., 2002). More recent data from the NHIS survey of 2007 identified that 31.8% of women who had visited a gynaecologist/obstetrician in the previous 12 months had used CAM. The most frequently used CAM therapies were herbal medicine (19.5%), massage (13.1%), yoga (11.2%) and chiropractic/osteopathy (9.9%) (Harrigan, 2011). There was a differential disclosure of CAM use to gynaecologist/obstetricians, manipulative therapies and acupuncture were reported by over 54% - 58% of women users whilst only 48.1% disclosed herbal medicine use (Harrigan, 2011). Again, this study did not identify the issues for which women were using CAM or their reasons for not disclosing their CAM use.

One of the few surveys to recently emerge that has some overlap with CPPD and CAM use was also the first to examine the use of CAM amongst US women suffering from chronic pelvic pain (CPP) (Chao et al., 2015). Half of the CPP sufferers had used at least one CAM in the previous 12 months (Chao et al., 2015). CAM users were more likely to have had some conventional treatment prior to their CAM use and to have reported minimal adverse effects from using CAM (Chao et al., 2015). This survey also found that unlike in a 1993 survey in which only 11% of women with gynaecological problems used conventional medicine concurrently with CAM

(Eisenberg et al., 1993), CAM users were often also using a variety of pharmaceutical medicine (Chao et al., 2015). Vitamins and minerals, diet, exercise and Western herbal medicine (WHM) were amongst those CAM most commonly used by women with CPP (Chao et al., 2015).

The Australian data on CAM use for CPPD are minimal and mostly decades out of date. Of CAM users in 2004, 14.8% of South Australia women cited menopause or PMS as their reason for using CAM (MacLennan et al., 2006). A survey conducted amongst women with PMS located in New South Wales doctors' waiting rooms and published in 1997 estimated a prevalence of CAM use of 21% in the previous three-month period and an ever-use of CAM of 34%. Two other cross-sectional studies involved an analysis of CAM practitioner use associated with different levels of vegetarian diet amongst young Australian women from ALSWH in 2000, and a focus group exploring women's experience in seeking treatment for menstrual problems involving 31 suffers and conducted in 1997. These earlier data are limited in scope, relevancy and information regarding CAM and specific CPPD issues.

1.6.8 Implications of conventional medical approach to CPPD treatment

A number of issues emerge regarding the conventional approach to CPPD treatment these are:

1. Efficacy - Cross-sectional studies indicate dissatisfaction rates of women who have sought medical help varies widely from a low 6% (Hylan et al., 1999) to as high as 66% (Campbell, E. M., Peterkin, O'Grady, & Sanson-Fisher, 1997; Hewison & van den Akker, 1996). Almost half of the women who consulted a physician with leg pain due to endometriosis were not offered any treatment (Missmer & Bove, 2011). In a study of women with pelvic pain, 82.7% classed their symptoms as 'somewhat' or 'not at all' resolved after seeking conventional help (Kuppermann et al., 2007). For women with HMB, there have been historical omissions in medicine to adequately deal both with the condition (Chapple, 1999) and its resultant anaemia (Chapple,

1999; Fraser et al., 2017). The current suggested best practice of the need to use multiple strategies in treating CPPD symptoms (Kaunitz et al., 2008; Taylor, 2005) also suggests treatment hitherto has lacked efficacy. Furthermore, cessation of treatment is associated with the recurrence of symptoms so treatment is likely to be needed long-term (Steiner, 2000). In addition, the effects of medications or approaches can be transitory and could in fact be attributable to a placebo effect (Kaunitz et al., 2008; Pullon, S.R. et al., 1989).

2. Cost - It has been estimated that 72% - 89% of women consulting a medical practitioner for PMS will be given a prescription although the type of medications favoured may be very variable from year to year (Weisz & Knaapen, 2009). With the relatively low uptake by women of medical treatments (Chia, Lai, Cheung, Kwong, Lau, & Leung, 2013; Hewison & van den Akker, 1996; Hylan et al., 1999; Pullon, S.R. et al., 1989) those who seek alternative solutions outside of the conventional system or who self-treat are incurring personal financial costs. The actual cost due to all aspects of conventional treatments, for women directly as well as for health service providers, in terms of negative side-effects, duration of treatment and reduction in function and/or quality of life need to be accurately assessed as the impacts appear to be large.

3. Adverse reactions – The adverse effects (AEs) of the various conventional treatments vary from minor to serious as discussed above. For the most common pharmaceutical treatments, OCPs and SSRIs, AEs range from minor consequences through to the very serious including a two- to four-fold increase in relative risk of life-threatening vascular events for OCPs (Spencer & Bonnema, 2011) and provoking thoughts of suicide for SSRIs (Kaunitz et al., 2008). Hysterectomies have been associated with 14% - 41% morbidity including haemorrhage, genitor-urinary tract disorders and urinary tract infections, and the readmission rate to hospital in Australia was 7.2% in 2000-2003 (Spilsbury et al., 2009).

4. Reach - International data collected over several decades on women's use of medical professional help or prescription drugs to treat CPPD symptoms have shown that the

level of uptake is low, between 16% - 48% (Adegbesan-Omilabu, Okunade, & Gbadegesin, 2014b; Campbell, E. M., Peterkin, O'Grady, et al., 1997; Eladawi, Abdel-Hady, El-Gilany, & Gibreel, 2014; Laberge et al., 2015; Pullon, S.R. et al., 1989; Sternfeld et al., 2002; Tolossa & Bekele, 2014). This is highlighted in Australia by research into pelvic pain and PMS where only a third and 54% of women respectively had sought professional help (Campbell, E. M., Peterkin, O'Grady, et al., 1997; Pitts et al., 2008). Women's preference to manage their symptoms and their motivations for eschewing conventional services, despite CPPD's impact, needs to be understood.

1.7 Chapter summary

A current PH/HSR method has been outlined to properly position the method that is most relevant for upgrading some aspects of CAM research and that also underlies the approach taken for this thesis. To better understand CAM, it has been defined and its scope of practice, user prevalence and user demographic features, motivations and the health conditions for which in general it is favoured across the world and within Australia have been reviewed.

This chapter has also provided the background to contextualize the significance of CPPD by examining its prevalence, internationally and in Australia, and mapping out its impact not only on the women who suffer from symptoms but also on their families, society, the health services and state. The role of conventional medicine in the treatment of this health issue based on the current understanding of CPPD aetiology has also been presented. Quantifiable costs both personal and state-related, though data is limited, have been explored.

The chapter that follows will begin the examination of cross-sectional data that relates CAM use by women with CPPD through internationally published surveys on

the topic to enhance the understanding of its prevalence, patterns of use, motivation, sources of information and subjective efficacy.

2. Literature Review

2.1 Chapter introduction

The overview of CPPD in Chapter 1 highlighted the importance and impact of the ubiquitous health issue represented by perimenstrual problems. Chapter 1 also presented the almost universal finding that women are the predominant CAM users. To now put the importance of CAM in treating CPPD in context, and to be able to evaluate CAM's current place within this area of healthcare, it is necessary to establish the extent to which women are known to use CAM to treat CPPD. In addition to finding out which CAM modalities women have used to deal with their specific symptoms, it would also be valuable to establish the demographic features of these CAM users.

Based on international studies that have been published in peer-reviewed journals, this chapter also explores women's perception of the effectiveness of CAM as a treatment strategy for CPPD and their information seeking behaviour and motivations for choosing to use CAM. In spite of the fact that CAM is a significant treatment adopted by women who regularly have CPPD issues, such information has not previously been collated and/or analysed. These data, therefore, provide baseline information on how women have dealt with their menstrual problems using CAM.

2.2 Background

2.2.1 The scope of Cyclic Perimenstrual and Pain Discomfort in the literature

This study is based on the principal symptoms that constitute CPPD, those of PMS, irregular periods, heavy periods and dysmenorrhoea, as discussed in Chapter 1. Endometriosis, mastalgia and leiomyomas (fibroids) have also been included, as

symptoms due to these conditions, dysmenorrhoea, breast tenderness and heavy periods respectively, are cyclical in nature, remit post-menstruation, begin again at any time from mid-cycle (the luteal phase) onwards and persist until or into the start of menstruation. These are the prime qualifications for the definition of CPPD (Taylor, 2005).

Whilst polycystic ovary syndrome (PCOS) may appear to be part of this particular group of women's reproductive health issues, as it frequently results in amenorrhoea or irregular periods, it does not, in fact, fulfil the criteria of being cyclical in nature with a period post-menstruation when it can be said to remit. In addition, PCOS lacks a universal, consistent symptom profile and diagnostic criteria, and its aetiology is highly likely to involve other endocrine and/or metabolic dysfunction. PCOS is characterised by high androgen levels and abnormal lipid metabolism and insulin activity, with increased insulin levels/glucose intolerance being a prominent feature in the majority of women with this condition (Norman, Dewailly, Legro, & Hickey, 2007).

However, whilst none of the studies included in the literature review specifically exclude women with PCOS, those women with amenorrhoea were automatically excluded from 25% of the study data because they specifically recruited only women who had a menstrual cycle. Amenorrhoea is a symptom in 84% of PCOS sufferers. The remaining 16% of women with PCOS, who have apparently normal cycles (Norman et al., 2007), therefore could still have been contributing data to the studies. If menstruating women with PCOS have been included in studies they have not been separately classified and are therefore unidentifiable in terms of their contribution to data collected.

2.2.2 Complementary and Alternative Medicine

For the purposes of this review, CAM used by women was inclusive of home remedies. The self-use of herbal teas, Tai chi, Qi gong and/or acupressure is

particularly prevalent amongst women in countries where TCM is 'mainstream' healthcare (Cheng, 2011a). The self-use of therapies such as massage and hot packs (Campbell, M. A. & McGrath, 1999; Chen, Lin, Heitkemper, & Wu, 2006; Hamaideh, Al-Ashram, & Al-Modallal, 2014; Missmer & Bove, 2011; Seven et al., 2014; Wong, L. P., 2011) are more culturally widespread, these practices may be adopted for empirical reasons (Campbell, M. A. & McGrath, 1999) or more likely either passed down through generations of women (Banikarim, Chacko, & Kelder, 2000; Chen et al., 2006) or gleaned from the many information sources available these days that disseminate self-help strategies (Campbell, M. A. & McGrath, 1999; Domoney et al., 2003a; Wong, L. P., 2011).

2.2.3 Complementary and alternative medicine utilisation for cyclic perimenstrual pain and discomfort

Clinical trials have established probable efficacy for select CAM in treating some CPPD symptoms. These include supplemental calcium (Ghanbari, Haghollahi, Shariat, Foroshani, & Ashrafi, 2009; Thys-Jacobs et al., 1998), vitamin B complex/B_6 (Brush, Bennett, & Hansen, 1988; Chocano-Bedoya et al., 2011), chiropractic (Fugh-Berman & Kronenberg, 2003), massage (Fugh-Berman & Kronenberg, 2003) and the herb *Vitex agnus castus* for moderate to severe PMS symptoms (Dennerstein et al., 2010; Schellenberg, 2001); vitamin E, fish oil, acupuncture (Bing & Xiaohua, 2011; Sriprasert, Suerungruang, Athilarp, Matanasarawoot, & Teekachunhatean, 2015), Chinese medicine, chiropractic (Fugh-Berman & Kronenberg, 2003) and aromatherapy for dysmenorrhoea (Davari, Reihani, & Khoshrang, 2014; Marzouk, El-Nemer, & Baraka, 2013; Matsumoto, Asakura, & Hayashi, 2013b). Limited evidence exists too for the benefit of magnesium (Fugh-Berman & Kronenberg, 2003) and EPO for PMS (Fugh-Berman & Kronenberg, 2003) and aromatherapy for menorrhagia and PMS (Marzouk et al., 2013).

Whilst clinical trials into CAM efficacy for treating aspects of CPPD have been published, to date, there have been no reviews of the types of CAM women

themselves choose to use for these symptoms. This lack is significant as CAM use is higher among women, especially in their reproductive years, and among those with chronic health issues. According to one study, CAM use is also higher among those whose health problems are not well addressed by conventional medicine (Williams et al., 2011). Women with CPPD fulfill all these criteria. In addition, many studies indicate that women predominantly choose not to seek professional help for CPPD. From recent surveys, reported between 2008 - 2014, the proportion of women who visited a CHP regarding CPPD symptoms ranged from 6% to 48% (Chia, Lai, Cheung, Kwong, Lau, & Leung, 2013; Eladawi et al., 2014; Lee, D. Y. et al., 2010; Seven et al., 2014; Sharma, A. et al., 2008; Tolossa & Bekele, 2014). Women with more severe symptoms accessed medical services more frequently than women with milder symptoms (Sternfeld et al., 2002; Tanaka et al., 2014). The reasons for not seeking professional help may be many-fold. Amongst possible causes for this reluctance are that women may feel their symptoms are not severe enough to warrant a visit to a doctor (Chapple, 1999; Hylan et al., 1999); the regularity with which problems recur may lead to an unwillingness to take long-term treatment (Campbell, M. A. & McGrath, 1999; Chen et al., 2006); symptoms may change from one cycle to the next making the decision to seek treatment difficult; symptoms become 'normalised', accepted as a natural part of womanhood (Agarwal & Venkat, 2009; Chapple, 1999; Hylan et al., 1999; Sharma, A. et al., 2008); or the belief that there is no effective treatment available (Campbell, M. A. & McGrath, 1999; Hylan et al., 1999). It is possible that different cultures' attitudes, acceptance and/or expectations of CPPD affect not only their tolerance of symptoms but also their acknowledgement of discomfort and consequent treatment-seeking behaviour (Lee, A. M., So-Kum Tang, & Chong, 2009).

2.3 A critical review of complementary and alternative medicine use by women with cyclic perimenstrual pain and discomfort: A focus upon prevalence, patterns and applications of use and users' motivations, information seeking and self-perceived efficacy

The results from this study have been published as follows:

Fisher C, Sibbritt D, Hickman L, Adams J. (2016) A critical review of complementary and alternative medicine use by women with cyclic perimenstrual pain and discomfort: a focus upon prevalence, patterns and applications of use and users' motivations, information seeking and self-perceived efficacy. *Acta Obstetricia et Gynecologica Scandinavica*. 95(8): 861-871.

A copy of this manuscript appears in Appendix 1.

2.3.1 Introduction

Cyclic perimenstrual pain and discomfort (CPPD) encompasses symptom clusters that recur in the premenstrual or luteal phase of the menstrual cycle (known as premenstrual syndrome or PMS) as well as those that may continue, or begin, during menstruation itself such as dysmenorrhea (Sharp et al., 2002). Symptoms may be predominantly physical (dysmenorrhea, headache, nausea, fluid retention, bloating, painful or tender breasts), affective (mental or emotional), or some combination of both (Nevatte, T. et al., 2013), are related to cyclical hormone changes, may involve one or many symptoms, may vary from one cycle to the next and appear to have no single etiology (Kaunitz et al., 2008; Milewicz & Jedrzejuk, 2006; Nevatte, T. et al., 2013).

CPPD is widely experienced by women across cultures, at some time during their reproductive life, with prevalence rates of women experiencing at least one CPPD-related symptom assessed as between 80 - 97% (Milewicz & Jedrzejuk, 2006; Wittchen et al., 2002). Whilst not all symptoms necessarily require treatment those women with moderately severe to severe symptoms, occurring in 40% (Milewicz & Jedrzejuk, 2006) and between 2-10% (Nevatte, T. et al., 2013; Wittchen et al., 2002) of women respectively, will probably seek help. A lack of both definitional clarity and understanding of underlying mechanism(s) (Kaunitz et al., 2008) have resulted

in the absence of a satisfactory treatment strategy (Kaunitz et al., 2008). It is possible that attitudes to CPPD amongst different cultures affect not only the experience of these symptoms but also the adoption of certain treatment-seeking behaviour (Lee, A. M. et al., 2009). Despite CPPD symptoms potentially resulting in varying levels of discomfort and interfering greatly with women's ability to work and lead a normal life at times during their cycles, many researchers have reported that with less severe CPPD symptoms women often do not seek professional help (Campbell, E. M., Peterkin, O'Grady, et al., 1997; Chia, Lai, Cheung, Kwong, Lau, & Leung, 2013; Corney & Stanton, 1991; Cronjé & Kritzinger, 1991; Eladawi et al., 2014; Hylan et al., 1999; Ohde et al., 2008; Pullon, S.R. et al., 1989; Seven et al., 2014; Sharma, A. et al., 2008; Tolossa & Bekele, 2014).

Current conventional treatments for CPPD include mainly hormone therapies, anti-depressants, analgesics and anti-inflammatory drugs, symptomatic drug regimes such as diuretics and, less frequently, surgical interventions such as oophorectomy (Nevatte, T. et al., 2013; Weisz & Knaapen, 2009; Wyatt et al., 2002). The variety of conventional treatments for CPPD, over 300 to date, range from conventional drugs through to nutritional and psychological approaches. All available treatments are recognised as not being wholly applicable or satisfactory for all women nor as necessarily providing long term solutions due to the unknown but likely mixed etiology of symptoms (Kaunitz et al., 2008; Wyatt et al., 2002).

Meanwhile, the use of complementary and alternative medicine (CAM) - comprising a range of diverse health care practices and products not traditionally associated with the medical curriculum or medical profession such as herbal medicine, acupuncture and massage - is high (Adams, Sibbritt, & Young, 2009; Harris, P. & Rees, 2000), particularly amongst women (Kristoffersen et al., 2014; Steinsbekk et al., 2009). There appears to be considerable use of CAM amongst women with CPPD (Abdul-Razzak, Ayoub, Abu-Taleb, & Obeidat, 2010; Campbell, E. M., Peterkin, O'Grady, et al., 1997; Cheng & Lin, 2011; Chia, Lai, Cheung, Kwong, Lau, & Leung, 2013; Eladawi et al., 2014; Kuppermann et al., 2007; Leather, Holland, Andrews, & Studd, 1993; Lee, D. Y. et al., 2010; Pullon, S.R. et al., 1989; Singh, Berman, Simpson,

& Annechild, 1998; Tanaka et al., 2014; Tolossa & Bekele, 2014), and a growing acceptance amongst medical professionals of the possible suitability of some CAM modalities for their treatment particularly herbal medicine, supplements and acupuncture (Gordon, Sobel, & Tarazona, 1998; Münstedt, Maisch, Tinneberg, & Hübner, 2014).

Whilst there are clinical trials showing efficacy of some CAM for treating aspects of CPPD such as acupuncture in treating dysmenorrhoea(Witt et al., 2008) and *Vitex agnus-castus* (Chaste tree berry) for PMS (Schellenberg, 2001) there is a need for further efficacy research. Moreover, while initial work provides some baseline data on CAM use for CPPD, this topic has till now been somewhat unco-ordinated and *ad hoc* (Milewicz & Jedrzejuk, 2006; Nevatte, T. et al., 2013). There is currently no critical or systematic overview of this sub-field of empirical literature, a situation made more pronounced and significant by the fact CAM use for CPPD raises challenges for those looking to provide and manage safe, effective care for affected women. There is a gap in health care providers' knowledge as to 'best practice' in treatment and an unknown risk regarding women's concomitant use of all therapies and the extent to which women fully disclose all treatments to their health carers.

In direct response to this identified research gap, this paper reports findings from the first critical review of CAM use amongst women with CPPD with a focus upon prevalence of use, those using CAM as well as self-perceived efficacy, motivations and information seeking behaviour of users.

2.3.2 Material and methods

In order to identify the contemporary literature reporting on CAM use for CPPD database searches of EBSCO, CINAHL, Medline, AMED and SCOPUS were conducted, using the following keywords "problem bleeding" or "abnormal uterine bleeding" or "abnormal vaginal bleeding" or "dysfunctional uterine bleeding" or "atypical uterine bleeding" or "inter*menstrual bleeding" or "excessive uterine bleeding" or

“excessive vaginal bleeding” or “excessive menstrual bleeding” or “menstruation disorder” or “menstruation disturbance” or “irregular bleeding/periods” or “irregular menstrual cycles” or “irregular menses” or “prolonged menstrual bleeding” or “prolonged uterine bleeding” or “prolonged periods” or “severe acute uterine bleeding” or “severe acute vaginal bleeding” or “dysmenorrh*ea” or “menstrual dysfunction”, “polymenorrh*ea” or “oligomenorrh*ea” or “hypermenorrh*ea" or “menometrorrhagia”, “uterine/vaginal h*emorrhage” or “metrorrhagia” or “painful periods” or “menstrual pain” or “irregular menses” or “frequent menses” or “menorrhagia” or “heavy menstrual bleeding” or “abnormally long or heavy menses” or “metropathia h*emorrhagica” or “increased menstrual loss” or “cycle related changes” or “pre*menstrual” AND “CAM” or “complementary medicine” or “complementary therapy” or “alternative medicine” or “alternative therapy” or “herbal medicine” or “herbal therapy” or “acupuncture” or “natural medicine” or “naturopathy” or “16pathy” or “traditional Chinese medicine” or “osteopathy” or “nutritional therapy” or “nutritional medicine” or “Ayurvedic medicine” or “massage therapy” or “aromatherapy” or “chiropractic” or “Reiki” or “hypnotherapy” or “spiritual therapy” or “integrative medicine” or “unorthodox medicine” or “unconventional medicine” or “nutritional supplement” or “herb”.

The search was confined to papers in English published in peer-reviewed journals and which reported new, empirical data regarding CAM use amongst adult female populations with any form of CPPD. In line with the aim and focus of the review, manuscripts which reported results from clinical trials (including randomised controlled trials) or case histories as well as those papers constituting reviews, letters or commentaries were excluded from the search. An additional hand search was undertaken in a selection of international peer-reviewed journals (*Acta Obstetrica et Gynecologica Scandinavica*, *BMC Women’s Health*, *American Journal of Obstetrics and Gynecology* and *Journal of Clinical Nursing*) which were considered leading journals in this area of health care to add confidence that all relevant international publications meeting the search inclusion criteria were identified.

Finally, Google Scholar was searched utilising a number of keywords from the extensive list above as an additional check.

To appraise the quality of papers identified for review, a quality scoring system based on previously described parameters used to assess prevalence studies of CAM use was employed (35). Details of quality scoring are provided in Table 2.1. Two authors employed the quality appraisal scoring system to assign a systematic, quantitative value to the studies separately, compared their results and resolved any discrepancies by discussion. The quality scores of papers are provided in Table 2.2.

2.3.3 Results

The initial search identified 7,006 records of which 113 papers were screened and from these 44 empirical studies met the selection criteria for inclusion in the review. Thirty-six of the included papers report cross-sectional studies that specifically relate to the use of CAM for CPPD treatment and eight other papers relate to cross-sectional surveys reporting CAM use results from more general populations (including and/or beyond women) which have reported on women with CPPD as one of a number of many other research interests. General information from each of the 44 articles is presented in Table 2.3.

Analyses of the extensive time period of our search (1986 to 2014) reveals the exponential growth in empirical research focusing upon this topic over recent years - indeed the last seven years has produced as many papers reporting research on women's use of CAM for CPPD symptoms as all research on this topic over the previous 22 years (1986-2007). Papers included in this review that are specific for CAM use in CPPD were conducted in Australia (3), U.K. (4), U.S. (9), Ethiopia (1), New Zealand (1), South Korea (1), Hong Kong (1), Japan (2) , Turkey (2) , Pakistan(1), Taiwan (3), Jordan (2) , Egypt (1), South Africa (1), Nigeria (1), Brazil (1), India (1) and one tri-nation study involving UK, US and France.

Table 2.1 Description of quality scoring for the Complementary and Alternative Medicine surveys reviewed

Dimensions of Quality Assessment		Points Awarded[a]
Methodology		
A.	Representative sampling strategy	1
B.	Sample size > 50	1
C.	Response rate > 75%	1
D.	Low recall bias – prospective or retrospective data collection within the past 12 months	1
Reporting of participants characteristics		1
E.	Status of CPPD assessed	1
F.	Age	1
G.	Ethnicity	1
H.	Indicator of socio-economic status (e.g. income, education)	
Reporting of CAM use		
I.	Definition of CAM or modalities provided to participants	1
J.	Participants can name CAM therapies/modalities Used (open question)	1
K.	Use of CAM modalities assessed	1

Data adapted from Adams, Barbery et al. 2013.
[a] Maximum score is 11 points
Quality of studies was assessed based on representativeness of women in the sample through methodology and participant characteristics (A, B, C, D, F, G, H) validity of diagnosis to assess CPPD (E) and CAM use (I, J, K).
CAM, complementary and alternative medicine; CPPD, cyclic perimenstrual pain and discomfort

2.3.3.1 Prevalence, patterns and applications of CAM use

Amongst all review papers, 32 focused specifically on CPPD symptom(s) which included CAM use prevalence (Abdul-Razzak et al., 2010; Adegbesan-Omilabu et al., 2014b; Borah, Nicholson, Bradley, & Stewart, 2013; Brito, Costa Marques, Santos Alves, & Silva, 2012; Brown, M. A. & Zimmer, 1986; Campbell, E. M., Peterkin, O'Grady, et al., 1997; Cheng, 2011a; Cheng & Lin, 2011; Chia, Lai, Cheung, Kwong, Lau, & Leung, 2013; Corney & Stanton, 1991; Cox et al., 2003; Cronjé & Kritzinger, 1991; Domoney et al., 2003a; Eladawi et al., 2014; Gold et al., 2007; Hamaideh et al., 2014; Hylan et al., 1999; Kraemer & Kraemer, 1998; Kuppermann et al., 2007; Leather et al., 1993; Lee, D. Y. et al., 2010; Missmer & Bove, 2011; Ohde et al., 2008; Pan et al., 2014; Pullon, S.R. et al., 1989; Seven et al., 2014; Sharma, A. et al., 2008; Singh et al., 1998; Sternfeld et al., 2002; Tanaka et al., 2014; Tariq et al., 2009;

Tolossa & Bekele, 2014) The CAM use timeframes surveyed were variously reported as current/most recent cycle (Cheng, 2011a; Corney & Stanton, 1991; Domoney et al., 2003a; Hylan et al., 1999; Ohde et al., 2008; Pullon, S.R. et al., 1989), last three months (Campbell, E. M., Peterkin, O'Grady, et al., 1997; Sharma, A. et al., 2008; Tanaka et al., 2014), last 6 months (Chia, Lai, Cheung, Kwong, Lau, & Leung, 2013), last 12 months (Cheng & Lin, 2011; Eladawi et al., 2014; Gold et al., 2007; Kraemer & Kraemer, 1998; Sternfeld et al., 2002); a 5-year period (Pan et al., 2014); and 'ever use' (Campbell, E. M., Peterkin, O'Grady, et al., 1997; Corney & Stanton, 1991; Domoney et al., 2003a; Kraemer & Kraemer, 1998; Kuppermann et al., 2007; Leather et al., 1993; Lee, D. Y. et al., 2010). However as shown in Table 2.3, 13 of the studies reviewed, failed to specify the time frame in their empirical work. Excluding data for 'ever use', 29 studies reported prevalence of CAM use between 0.9-98.4 % (mean=32.8%, median = 32.0%) (Abdul-Razzak et al., 2010; Adegbesan-Omilabu et al., 2014b; Borah et al., 2013; Brito et al., 2012; Brown, M. A. & Zimmer, 1986; Campbell, E. M., Peterkin, O'Grady, et al., 1997; Cheng, 2011a; Cheng & Lin, 2011; Chia, Lai, Cheung, Kwong, Lau, & Leung, 2013; Corney & Stanton, 1991; Cox et al., 2003; Cronjé & Kritzinger, 1991; Domoney et al., 2003a; Eladawi et al., 2014; Gold et al., 2007; Hamaideh et al., 2014; Hylan et al., 1999; Kraemer & Kraemer, 1998; Missmer & Bove, 2011; Ohde et al., 2008; Pan et al., 2014; Pullon, S.R. et al., 1989; Seven et al., 2014; Sharma, A. et al., 2008; Singh et al., 1998; Sternfeld et al., 2002; Tanaka et al., 2014; Tariq et al., 2009; Tolossa & Bekele, 2014) when applying the broadest definition of CAM including self-treatments and home remedies. By comparison CAM use prevalence rates for all surveys post-2008 had a mean=34.4% and median=34.3% and pre-2008 these were mean=30.4%, median=21.0%. Reported prevalence rates for CAM 'ever users' ranged from 22.4-92.0% (mean=63.0%, median=74.0%) (Campbell, E. M., Peterkin, O'Grady, et al., 1997; Corney & Stanton, 1991; Domoney et al., 2003a; Kraemer & Kraemer, 1998; Kuppermann et al., 2007; Leather et al., 1993; Lee, D. Y. et al., 2010).

Reported prevalence of use of vitamin/mineral supplements, including vitamin $B_{6,}$ ranged from 9-34% (mean=23.1%, median=24.7%) (Corney & Stanton, 1991; Kuppermann et al., 2007; Pullon, S.R. et al., 1989; Sternfeld et al., 2002) in large

studies (n > 499), from 4.3-62.5% (mean=22.2%, median=17.0%) current use (Campbell, E. M., Peterkin, O'Grady, et al., 1997; Chia, Lai, Cheung, Kwong, Lau, & Leung, 2013; Domoney et al., 2003a; Hamaideh et al., 2014; Kraemer & Kraemer, 1998) and 34.0-92.0% "ever use" (Campbell, E. M., Peterkin, O'Grady, et al., 1997; Domoney et al., 2003a; Kraemer & Kraemer, 1998; Leather et al., 1993) in those of smaller sample size (n< 500). Other CAM in this category reportedly used by PMS sufferers included Evening Primrose Oil (EPO) (Campbell, E. M., Peterkin, O'Grady, et al., 1997; Corney & Stanton, 1991; Domoney et al., 2003a; Hylan et al., 1999; Kraemer & Kraemer, 1998; Leather et al., 1993), calcium (Sternfeld et al., 2002), magnesium (Leather et al., 1993; Sternfeld et al., 2002) and zinc (Leather et al., 1993).

From surveys targeting CAM use and CPPD, we grouped those reporting herbs, traditional medicine, Chinese herbal medicine (CHM) or traditional Chinese medicine (TCM) together as herbal medicine. In large sample-sized studies, prevalence of use ranged between 0.5-69.7% (mean= 31.1%, median=35.0%) (Cheng, 2011a; Cheng & Lin, 2011; Eladawi et al., 2014; Kuppermann et al., 2007; Lee, D. Y. et al., 2010; Pan et al., 2014; Singh et al., 1998; Sternfeld et al., 2002; Tariq et al., 2009) and in small sample studies from 7.0-37.3% (mean=20.6%, median=20.7%) (Abdul-Razzak et al., 2010; Adegbesan-Omilabu et al., 2014b; Chia, Lai, Cheung, Kwong, Lau, & Leung, 2013; Domoney et al., 2003a; Hamaideh et al., 2014; Missmer & Bove, 2011; Seven et al., 2014; Tanaka et al., 2014). User-prevalence for CHM/TCM had mean and median values of 28.8% and 22.4% respectively (Cheng, 2011a; Cheng & Lin, 2011; Chia, Lai, Cheung, Kwong, Lau, & Leung, 2013; Lee, D. Y. et al., 2010; Pan et al., 2014; Singh et al., 1998; Tanaka et al., 2014). Herbs identified were *Si-Wu-Tang* (Cheng, 2011a), *Zhong-Jing Tang* (Cheng, 2011a), *Dang-Qui-Shao-Ya-San* (Cheng & Lin, 2011; Hsieh et al., 2008; Pan et al., 2014), St. John's wort (Domoney et al., 2003a; Sternfeld et al., 2002), ginger (Cheng, 2011a; Cheng & Lin, 2011) and cinnamon (Hamaideh et al., 2014). Herbal medicine may be part of treatment described as hot drinks/tea and home remedies but were not included in our herbal medicine calculations.

Other CAM modalities reported for CPPD use in reviewed papers (not all with prevalence of use data) were homeopathy (range 0.9-14%) (Cronjé & Kritzinger, 1991; Domoney et al., 2003a; Singh et al., 1998; Tariq et al., 2009), acupuncture (range 0.1-31.0%) (Corney & Stanton, 1991; Domoney et al., 2003a; Kuppermann et al., 2007; Missmer & Bove, 2011; Singh et al., 1998), massage (range 1.4-61.0%) (Brito et al., 2012; Campbell, E. M., Peterkin, O'Grady, et al., 1997; Hamaideh et al., 2014; Missmer & Bove, 2011; Pullon, S.R. et al., 1989; Seven et al., 2014; Singh et al., 1998; Sternfeld et al., 2002; Tolossa & Bekele, 2014), mind/body therapies e.g. yoga and meditation (range 0-9.5%) (Corney & Stanton, 1991; Domoney et al., 2003a; Pullon, S.R. et al., 1989; Singh et al., 1998; Sternfeld et al., 2002), aromatherapy (Domoney et al., 2003a), special/hot drinks/tea/coffee (Chia, Lai, Cheung, Kwong, Lau, & Leung, 2013; Eladawi et al., 2014; Hamaideh et al., 2014; Tolossa & Bekele, 2014), faith healing (Corney & Stanton, 1991) and Ayurvedic medicine (Sharma, A. et al., 2008).

CAM practitioners in countries where conventional medicine predominates were consulted by 4.0-12% of women in reviewed surveys (Brown, M. A. & Zimmer, 1986; Campbell, E. M., Peterkin, O'Grady, et al., 1997; Corney & Stanton, 1991) and a 2002 U.S. study reported premenstrual dysphoric disorder sufferers were more likely to consult CAM practitioners than those with less severe PMS (Chawla et al., 2002). However, the 1991 PMS U.K. survey found 22.0% of women consulted both medical and "non-medical" providers (Corney & Stanton, 1991) and 7.1% of Taiwanese women recorded simultaneously using conventional and CAM for CPPD (Cheng, 2011a).

Two PMS surveys of 'ever use' reported that at least 20% of respondents had tried five or more treatments (Brown, M. A. & Zimmer, 1986; Campbell, E. M., Peterkin, O'Grady, et al., 1997) and attendees at PMS clinics recorded they had tried one to 12 CAM (mean=3.2) (Domoney et al., 2003a) and a median of four self-help remedies (including CAM) (Leather et al., 1993). Meanwhile, a comparative survey across the U.S., U.K. and France, of all non-prescription medicines used (CAM and non-CAM) to treat PMS reported only U.K. women mentioned CAM (Hylan et al.,

1999). In four population-based studies examining broad CAM use (beyond CPPD) and included in the review, irregular bleeding and dysmenorrhea are identified as among the five most common reasons for CAM use (Awad, Eltayeb, & Capps, 2006; Hsieh et al., 2008; Pan et al., 2014; Sawalha, Sweileh, Zyoud, & Jabi, 2008).

The reviewed literature identified various CPPD symptoms in which women used CAM. As shown in Table 2.3 two papers specifically surveyed general CPPD and CAM, most of those remaining referred to dysmenorrhea and PMS. Of all reviewed papers 21, (see Table 2.3), represent data from countries retaining a strong culture/reliance on traditional medicine. Papers surveying dysmenorrhea included six small studies (n=23-616) with age range 16 – 28 years (Abdul-Razzak et al., 2010; Chen et al., 2006; Cheng & Lin, 2011; Chia, Lai, Cheung, Kwong, Lau, & Leung, 2013; Cronjé & Kritzinger, 1991; Seven et al., 2014), the remaining seven spanned menarche-55 years of age (Brito et al., 2012; Cheng, 2011a; Lee, D. Y. et al., 2010; Ohde et al., 2008; Pan et al., 2014; Tanaka et al., 2014; Tariq et al., 2009) of which all but one was based on sample sizes of 500 or more (n= 274-23118). In the very large sample of dysmenorrhoeic, Taiwanese women 53.4% used mostly practitioner-prescribed CHM (Pan et al., 2014). However, a Japanese prospective study noted CAM was used equally by all women whether or not they experienced dysmenorrhea (Ohde et al., 2008). Chia et al. (2013) found pain in the middle of menstruation increased the likelihood that young Hong Kong women would resort to 'non-pharmacological' self-treatments than if pain occurred premenstrually or at either end of the period (Chia, Lai, Cheung, Kwong, Lau, & Leung, 2013).

CAM treatment of PMS was reported in fifteen reviewed papers, three failed to define symptoms (Brown, M. A. & Zimmer, 1986; Domoney et al., 2003a; Leather et al., 1993), and the remaining surveys, (see Table 2.3), referred to both affective and physical symptoms.

Age ranges for the majority of these surveys, irrespective of sample size, fell between 18-43 years (range 15–64 years). Data collected by Gold et al. suggested women with physical PMS symptoms were more likely to use CAM than not (Gold et

al., 2007). However, two studies surveying premenstrual dysphoric disorder sufferers reported these women's higher use of CAM therapies (Sternfeld et al., 2002) and visits to CAM practitioners (Chawla et al., 2002) compared to those with milder PMS symptoms.

Additionally our review identified papers in which CAM use was associated with endometriosis (Cox et al., 2003; Tanaka et al., 2014) and its associated leg pain (Missmer & Bove, 2011); pelvic problems (pain, pressure and dysfunctional uterine bleeding)(Kuppermann et al., 2007) , fibroids (Adegbesan-Omilabu et al., 2014b; Borah et al., 2013; Kronenberg, Cushman, Wade, Kalmuss, & Chao, 2006; Tanaka et al., 2014), menstrual problems including irregular cycles in younger women (Sharma, A. et al., 2008), menorrhagia (Chapple, 1999) and mastalgia (mostly, but not exclusively, cyclical) (Eladawi et al., 2014). With increased symptom severity, women's reported use of medication, including CAM increased (Campbell, E. M., Peterkin, O'Grady, et al., 1997; Chia, Lai, Cheung, Kwong, Lau, & Leung, 2013; Sternfeld et al., 2002; Tariq et al., 2009). Tariq et al. (2009) found CAM use was more likely if symptoms resulted in prolonged time off work (Tariq et al., 2009) and greater symptom frequency in Cheng and Lin's sample increased CAM use (Cheng & Lin, 2011). Meanwhile newer patients attending a conventional PMS clinic in the U.K. continued CAM use but after more than five years attendance were likely to cease its regular use (Domoney et al., 2003a).

Data is scant and inconsistent in the reviewed papers, regarding age, CAM use and CPPD. From the large Taiwanese database women aged 21-30 years were more likely to use TCM than older or younger age groups (Pan et al., 2014) but the survey of 15-39 year old South Korean women suggested age was irrelevant with just over 20% of all women choosing to use CHM (Lee, D. Y. et al., 2010). In the U.S., Sternfeld et al. (2002) reported, CAM use was higher amongst older women with PMS (Sternfeld et al., 2002) but for women with fibroids younger women were greater

Table 2.2 - Quality Assessment of Reviewed Articles

First Author	Methodology				Participant characteristics				CAM reporting			Total
	Sampling A	Size >500 B	Response rate >75% C	Recall bias D	Status of CPPD E	Age F	Ethnicity G	SES H	Defined to participants I	Participant can name (open) J	Use assessed K	
1. Kupperman et al. 2007	1	1	1	1	1	1	1	1	0	0	1	9
2. Sternfeld et al. 2002	1	1	0	1	1	1	1	1	1	0	1	9
3.Pan et al. 2014	1	1	1	1	1	1	1	1	0	0	1	9
4. Hsieh et al. 2008	1	1	1	2	1	1	0	0	1	0	1	9
5. Kronenberg et al. 2006	1	1	1	1	0	1	1	1	1	0	1	9
6. Gold et al. 2007	1	1	1	1	0	1	1	1	1	0	0	8
7. Ohde et al. 2008	1	1	1	1	1	1	0	1	1	0	0	8
8. Chawla et al. 2002	1	1	1	1	1	1	1	1	0	0	0	8
9. Singh et al. 1998	1	1	0	0	0	1	1	0	1	1	1	7
10.Cheng 2011	0	1	1	1	1	1	0	0	1	0	1	7
11 Cheng & Lin 2011	0	1	1	1	1	1	0	0	1	0	1	7
12.Hylan et al. 1999	1	1	0	1	1	1	0	1	0	1	0	7
13.Kraemer & Kraemer 1998	0	0	0	1	1	1	1	1	0	1	1	7
14. Baines et al. 2007	1	1	1	1	0	1	0	1	1	0	0	7
15.Awad et al. 2006	1	1	1	0	0	1	0	1	0	1	1	7
16. Campbell & McGrath 1999	0	0	0	1	1	1	0	1	1	0	1	6

Table 2.2 continued

First Author	Methodology				Participant characteristics				CAM reporting			Total
	Sampling A	Size >500 B	Response rate >75% C	Recall bias D	Status of CPPD E	Age F	Ethnicity G	SES H	Defined to participants I	Participant can name (open) J	Use assessed K	
17. Pullon et al. 1989	0	1	1	1	0	0	0	1	1	0	1	6
18.Corney & Stanton 1991	0	1	0	1	1	1	0	1	0	0	1	6
19.Borah et al. 2013	1	1	0	0	1	1	1	1	0	0	0	6
20. Tariq 2009	0	1	0	0	1	1	0	1	0	1	1	6
21.Tanaka et al. 2014	0	0	0	1	1	1	0	1	1	0	1	6
22. Hamaideh et al. 2014	0	0	0	0	1	1	0	1	1	1	1	6
23.Critchley et al. 2005	0	0	0	1	0	1	1	1	1	1	0	6
24. Lee et al. 2010	1	1	0	0	0	1	0	0	0	1	1	5
25. Chia et al. 2013	0	0	1	1	0	1	0	0	1	0	1	5
26. Eladawi et al. 2014	0	1	1	1	1	1	0	0	0	0	0	5
27.Cronje & Kritzinger 1991	0	0	1	0	0	1	1	0	0	1	1	5
28. Adegbesan-Omilabu et al 2014	0	0	0	0	1	1	0	1	0	1	1	5
30.Sharma et al, 2008	0	0	1	1	1	1	0	0	0	1	0	5
31.Cox et al. 2003	1	0	1	0	1	1	0	0	0	1	0	5
32.Nicholson 2006	0	1	1	0	0	1	1	0	0	1	0	5
33.Tolossa & Bekele 2014	0	0	1	0	1	1	0	0	0	0	1	4

Table 2.2 continued

First Author	Methodology				Participant characteristics				CAM reporting			Total
	Sampling A	Size >500 B	Response rate >75% C	Recall bias D	Status of CPPD E	Age F	Ethnicity G	SES H	Defined to participants I	Participant can name (open) J	Use assessed K	
34. Missimer & Bove 2011	0	0	0	0	1	1	1	0	0	0	1	4
35. Leather et al. 1993	0	0	0	0	1	1	0	0	0	1	1	4
36.Brito et al. 2012	0	1	0	0	0	1	0	0	0	1	1	4
37. Sawalha et al 2008	0	1	1	0	0	1	0	0	0	1	0	4
38. Byles et al. 1997	1	0	1	0	0	1	0	0	0	1	0	4
39.AlBraik et al. 2008	0	0	0	1	0	1	0	1	0	0	1	4
40. Chapple 1999	0	0	0	0	0	1	1	1	0	1	0	4
41.Domoney et al 2003	0	0	0	0	1	1	0	0	0	1	1	3
42.Abdul-Razzak et al. 2010	0	0	0	0	0	1	0	0	1	0	1	3
43.Brown & Zimmer 1986	0	0	0	0	0	1	0	0	0	1	1	3
44. Chen et al. 2006	0	0	0	0	0	1	1	0	0	1	0	3

CAM users according to Borah et al. (Borah et al., 2013). Age did not determine how many CAM therapies women attending a PMS clinic reported trying (Domoney et al., 2003a).

Further reported profile details of women using CAM for CPPD was limited in reviewed papers, providing only brief information with regards to ethnicity, lifestyle factors, socio-economic and health status. The Taiwanese dysmenorrhea study by Pan et al. (2014) of 23,118 women found CAM use was higher amongst lower income women (Pan et al., 2014). Of 12 tertiary students studies (majority aged 18-30 years) into medication in CPPD, three indicated CAM (including non-pharmacological treatments) were those most used (Cheng, 2011a; Chia, Lai, Cheung, Kwong, Lau, & Leung, 2013; Eladawi et al., 2014), eight indicated that they were amongst those most commonly
used (Abdul-Razzak et al., 2010; Brito et al., 2012; Cheng & Lin, 2011; Hamaideh et al., 2014; Seven et al., 2014; Sharma, A. et al., 2008; Tariq et al., 2009; Tolossa & Bekele, 2014) with only the 1991 South Africa survey reporting very low CAM usage (Cronjé & Kritzinger, 1991). Race/ethnic-specific data was limited to U.S. surveys where the highest CAM use for CPPD was found amongst white women (Gold et al., 2007; Kronenberg et al., 2006; Sternfeld et al., 2002). Sternfeld et al. (2002) in U.S. reported CAM use for PMS was associated with women having a comorbidity and those who undertook regular, exertional exercise (Sternfeld et al., 2002) whilst Australian research identified non-vegetarians who experienced lower levels of CPPD were also less likely than vegetarians and semi-vegetarians to have consulted a CAM practitioner (Baines, Powers, & Brown, 2007).

2.3.3.2 Self-Perceived Efficacy, Risk and Safety

There was variation of reported efficacy measured across different CAM modalities within studies but maximum self-perceived efficacy ratings (including registering effectiveness, satisfaction or improvement) for CAM in treating CPPD symptoms were generally high. Ratings reported were 33% - 97% for PMS sufferers (Corney &

Stanton, 1991; Domoney et al., 2003a; Kraemer & Kraemer, 1998; Leather et al., 1993; Pullon, S.R. et al., 1989; Singh et al., 1998), 93 - 99% for dysmenorrhea (Cheng & Lin, 2011; Chia, Lai, Cheung, Kwong, Lau, & Leung, 2013), 79% for endometriosis (Missmer & Bove, 2011) and 27.7% for pelvic discomfort (Kuppermann et al., 2007). However, the reported number of side-effects experienced or symptom-worsening which women associated with CAM use was considerably less than for conventional medicine (Kuppermann et al., 2007; Leather et al., 1993). Dissatisfaction with or finding CAM 'unhelpful', ranged from 14% - 69% where reported (Corney & Stanton, 1991; Domoney et al., 2003a; Kraemer & Kraemer, 1998). Meanwhile, women's rating of CAM practitioners were limited to two PMS-focused studies where of those women who consulted a particular modality the recorded maximum satisfaction was 74.6% with regards to homeopaths (Corney & Stanton, 1991) and 50% for osteopaths (Brown, M. A. & Zimmer, 1986).

In each of a number of studies reviewed, over 50% of participating women with CPPD believed their use of CAM was satisfactory or very satisfactory specifically for vitamins/supplements for pelvic discomfort (Kuppermann et al., 2007), dysmenorrhea (Chia, Lai, Cheung, Kwong, Lau, & Leung, 2013) and PMS (Campbell, E. M., Peterkin, O'Grady, et al., 1997; Domoney et al., 2003a; Pullon, S.R. et al., 1989) (vitamin B_6 especially for affective symptoms (Pullon, S.R. et al., 1989)); herbs for pelvic discomfort (Kuppermann et al., 2007) and dysmenorrhea (Cheng & Lin, 2011; Chia, Lai, Cheung, Kwong, Lau, & Leung, 2013); acupuncture for pelvic discomfort (Kuppermann et al., 2007), PMS (Domoney et al., 2003a) and endometriosis leg-pain (Missmer & Bove, 2011); homeopathy for PMS (Domoney et al., 2003a; Singh et al., 1998); mind-body/yoga for PMS (Pullon, S.R. et al., 1989; Singh et al., 1998); and massage for endometriosis leg-pain (Missmer & Bove, 2011) and PMS (Campbell, E. M., Peterkin, O'Grady, et al., 1997; Pullon, S.R. et al., 1989). A New Zealand survey reported that the severity of symptoms did not appear to influence PMS sufferers' perceived treatment efficacy regarding their CAM use (Pullon, S.R. et al., 1989).

In the U.S. study on treating pelvic problems, Kupperman et al. (2007) found women with a lower income and educational status and those of African-American origin reported greater satisfaction levels, than either white or Asian women, for CAM and that self-rated satisfaction increased with the fewer conventional medicines and more CAM treatments used, the more effectively symptoms resolved, and with better mental well-being (Kuppermann et al., 2007). Within a focus group conducted in Australia, participants felt CAM's effectiveness for endometriosis ranged from helping temporarily to providing a "radical improvement" (Cox et al., 2003).

2.3.3.3 Communication and information seeking of CAM users

Detailed information/advice about CAM use for PMS as reported by Domoney et al. (2003) came from a number of sources including friends and/or family, media, internet and medical personnel (Domoney et al., 2003a). Interestingly, 29% of women in this study reported their CAM information as sourced from medical practitioners (Domoney et al., 2003a). The focus group consisting of 16 to 19 year-old Taiwanese women from Kaohsiung who used self-care strategies to manage dysmenorrhea indicated their mothers' directed their use of Chinese herbs to correct energy deficiencies, "regulate the uterus" and "cleanse the body" (Chen et al., 2006).

2.3.3.4 Motivations for using/not using CAM

Whilst motivation for not using conventional medicine to treat CPPD symptoms was indicated in eight studies included in the review (Adegbesan-Omilabu et al., 2014b; Borah et al., 2013; Byles et al., 1997; Chapple, 1999; Cox et al., 2003; Hylan et al., 1999; Seven et al., 2014; Tanaka et al., 2014), none reported on women's reasons for choosing CAM. Four focus group studies, two from Australia and one each from UK and Taiwan, canvassed the experiences and thoughts of women across a range

of ages and mainly suffering one aspect of CPPD to provide more detailed attitudinal data for CAM use in their treatment (Byles et al., 1997; Chapple, 1999; Chen et al., 2006; Cox et al., 2003). Motivations for using CAM expressed by participants of an Australian focus group where 60 of 61 had adopted CAM in treating endometriosis were to enable them to gain control of their situation, be drug free, avoid surgery and 'get off the medical roundabout' (Cox et al., 2003). Cost was however cited as a difficulty by this group in using CAM (Cox et al., 2003). Whilst the other Australian focus group of sixteen 30-50 year old women with menstrual problems expressed "widespread acceptance of alternative natural remedies", taking pills "for pain relief weren't the only answer" and a preference for a "natural remedy" (Byles et al., 1997). Some Taiwanese young women believed medicinal herbs would reduce dysmenorrhea next menstrual period (Chen et al., 2006).

2.3.4 Discussion

This article provides the first review of international studies of CAM use by women with CPPD problems. The analyses of the last 29 years of empirical study on this topic reveals a number of significant findings that impact on and have implications for future practice and policy.

Data from 14 out of 21 (Abdul-Razzak et al., 2010; Brito et al., 2012; Brown, M. A. & Zimmer, 1986; Campbell, E. M., Peterkin, O'Grady, et al., 1997; Cheng, 2011a; Cheng & Lin, 2011; Chia, Lai, Cheung, Kwong, Lau, & Leung, 2013; Cronjé & Kritzinger, 1991; Eladawi et al., 2014; Gold et al., 2007; Hamaideh et al., 2014; Hylan et al., 1999; Kraemer & Kraemer, 1998; Lee, D. Y. et al., 2010; Pullon, S.R. et al., 1989; Seven et al., 2014; Sharma, A. et al., 2008; Singh et al., 1998; Sternfeld et al., 2002; Tariq et al., 2009; Tolossa & Bekele, 2014) of our reviewed papers, irrespective of cultural background, recorded prevalence rates of CPPD of 80% or more, supporting its very high prevalence generally reported in the literature (Milewicz & Jedrzejuk, 2006; Sharp et al., 2002; Wittchen et al., 2002). Variation in

these rates is likely to be exacerbated by the lack of consistent definitions and questioning regarding frequency and severity of symptoms. There are many general studies of CAM use confirming its uptake has increased throughout the world, especially amongst women (Kristoffersen et al., 2014; Steinsbekk et al., 2009). That this increase can be related also to the treatment of CPPD in high income countries, is supported by the fall, in both the USA and UK, of medical prescriptions for CPPD identified in the 1990s (Weisz & Knaapen, 2009; Wyatt et al., 2002). Indeed, as far back as 2002, Wyatt et al., reported the unexpected prescription-rate drop even as there was increasing acceptance of PMS in the UK, leading them to speculate this may be because women increasingly turned to CAM (Wyatt et al., 2002). The fact that in our review the last seven years has seen as much study into this subject as was reported in previous decades tends to add support to this interpretation. However, since 2008 interest in CAM for CPPD has largely been explored in countries where traditional medicine practices have been maintained, the majority of recent surveys (18 out of 21) having been conducted in African, Far and Middle Eastern countries. We nonetheless found studies supporting CAM use in Western countries where "ever use" of CAM by women with PMS shows high user prevalence of 74%-92%.

Whilst reported strategies in the review papers reflect some cultural nuances they show considerable use is being made of CAM to treat CPPD problems. Not only are a large range of CAM treatments used, but multiple CAM appear to be used concurrently (AlBraik, Rutter, & Brown, 2008; Brown, M. A. & Zimmer, 1986; Campbell, E. M., Peterkin, O'Grady, et al., 1997; Cheng, 2011a; Cheng & Lin, 2011; Chia, Lai, Cheung, Kwong, Lau, & Leung, 2013; Corney & Stanton, 1991; Domoney et al., 2003a; Eladawi et al., 2014; Hamaideh et al., 2014; Kraemer & Kraemer, 1998; Kuppermann et al., 2007; Leather et al., 1993; Missmer & Bove, 2011; Pullon, S.R. et al., 1989; Seven et al., 2014; Sharma, A. et al., 2008). Possible explanations for increasing adoption of CAM are suggested by focus group members who emphasised preferences for 'natural' treatments and to help them wrest back control of their own health. The investigation into increased CAM use remains woefully unexplored, but much needed, to ensure its safe and effective use in the

future. The established high need for effective treatment coupled with a lack of reliable current information highlights the difficulty for informed guidance in future health policy and practice worldwide in treating CPPD.

Our review also provides good evidence that a large proportion of women with CPPD choose not to consult any health professional for help. Lack of consultation has been noted by other authors, with suggested reasons ranging from not wishing to 'medicalise' a natural process, acceptance of CPPD as 'normal' or because of the perception of ineffective available treatments (Kaunitz et al., 2008; Sharp et al., 2002; Weisz & Knaapen, 2009; Wyatt et al., 2002). Therefore, it is extremely likely there will continue to be increasing use of CAM for CPPD through self-prescription. The motivation for not seeking professional CAM help remains unexplored but higher levels of self-prescribed CAM compared to professional CAM consultation is not new (Kristoffersen et al., 2014; Nicholson, 2006) and may be an economic measure or the perception that CAM is natural and therefore safe (AlBraik et al., 2008). Indeed, reviewed studies reported that from a third to more than 90% of participating woman rated CAM effective in treating many symptoms, with few reporting adverse effects from CAM use. Self-prescription of CAM and conventional medicine for CPPD appears widespread, probably reflecting not only symptom prevalence throughout women's reproductive lives, but also lack of effective treatment. Additionally, there are reports of a relatively high placebo effect, from 10-50%, across both conventional and CAM treatments for CPPD (Kaunitz et al., 2008; Pullon, S.R. et al., 1989; Sharp et al., 2002; Wyatt et al., 2002), leading to uncertainty regarding general efficacy. This situation should raise concerns for healthcare providers across the board regarding both efficacy and safety and because concomitant use of conventional medicine and CAM has potential for adverse interactions but is often undisclosed to health professionals (Adams, Barbery, et al., 2013; Critchley, Chen, Lee, Thomas, & Tomlinson, 2005; Sawalha et al., 2008).

The reviewed papers clearly show that women use CAM to treat a wide range of CPPD symptoms from the most common dysmenorrhea and PMS to premenstrual

dysphoric disorder, fibroids, mastalgia, pelvic discomfort and endometriosis, with lower prevalence. However, the level of CPPD symptoms and adopted treatments, other than PMS, has not been well explored in large samples of women below the age of 28 years. Our data whilst suggesting that CAM modalities are differentially preferred for particular aspects of CPPD is less clear if this is related to efficacy or simply reflects their official endorsement by medical practitioners amongst others.

Difficulties arise when comparing findings from the reviewed papers with reported studies varying greatly in sampling methodology (convenience, self-selection, random), sources (half arose from tertiary and conventional medical settings) and quality of survey instruments, only some of which were pre-tested and/or validated. Prevalence calculations of CAM use were made from varying baselines - whole mixed gender populations/women in selected age range/only women with CPPD of survey's interest. Levels of recall bias are likely to vary - five reviewed studies were prospective (Brito et al., 2012; Chawla et al., 2002; Ohde et al., 2008; Seven et al., 2014; Sternfeld et al., 2002) compared to 39 which were retrospective questionnaires. In addition, where supplied there was considerable variation in response rates (11%-100%), time frames for measuring CAM usage (last monthly cycle – ever) and detail of CAM lists, if supplied, which would alter levels of data capture. Indeed, CAM was unspecified in 28 out of 45 of these studies. Finally, as most reviewed papers did not include geographical location data the extent to which differential access to CAM therapies, particularly in rural communities, may have altered measured prevalence of CAM use is unknown. Importantly prevalence of total CAM use for CPPD is likely understated by our data as this was reported on individual modalities/treatments and many surveys reported women using more than one CAM entity. On the other hand, the broad interpretation of CAM to include home remedies may have led to some overstatement of user prevalence.

An important limitation of this review is that only English language papers were included. In addition, the inclusion of papers over this long time-frame, whilst highlighting changing trends in CAM use for women with CPPD, makes comparisons difficult as attitudes, acceptance and scope of CAM has changed markedly over the

Table 2.3 General Information on Research Articles into CAM and CPPD

First Author Country	Year / Resp. rate	Design/ Sample	Max. CAM Prevalence/ Baseline	CAM Therapies used/ List supplied?	Sample size/ Age range	Time frame reported / CAM self-prescribed	Symptoms treated/ Validated diagnostic assessment
1. Campbell et al. Australia	1997 69%	SCQ Multiple GP clinics	Ever - 34% 3 mo -21% Whole sample	Vitamins, massage, EPO Yes	310 18-45y	Ever and last 3 months Unspecified	Premenstrual Syndrome – physical and affective Yes
2. Domoney et al. United Kingdom	2003 N/A	SCQ 1 site- PMS clinic	Ever – 91% Current–35% Sufferers	Supplements, herbs, EPO acupuncture, homeopathy Unspecified	100 25 –54y	Ever and current Unspecified	Premenstrual Syndrome – unspecified GP referred
3. Singh et al. United States	1998 11%	Interviewer Commercial database (telephone)	1.5% Whole sample	Mind/body, massage, homeopathy, herbs, chiropractic, acupuncture Yes	1052 21 – 64y	Unspecified Unspecified	Premenstrual Syndrome – physical and affective Unspecified
4. Tolossa & Bekele Ethiopia	2014 86.4%	SCQ Tertiary students, 1 site	7.5% Whole sample	Hot drinks, massage Unspecified	173 18 – 25y	Unspecified Unspecified	Premenstrual Syndrome – physical and affective Yes
5. Pullon et al. New Zealand	1989 96%	Interviewer Multiple GP clinics	33% Sufferers	Massage, yoga, vitamin B_6 Yes	1456 15 – 54y	Last cycle Yes	Premenstrual Syndrome – physical and affective Unspecified
6. Lee et al. South Korea	2010 11.6%	SCQ Commercial database (on-line)	22.4% Sufferers	Chinese herbal medicine Yes- limited	500 15- 39y	Used at least once (Ever use) Unspecified	Dysmenorrhoea Unspecified
7. Corney & Stanton United Kingdom	1991 68 - 77%	SCQ Response to advert in two written media	Ever – 74% Last month -9% Sufferers	Vitamins, homeopathic, EPO Unspecified	658 16 – 45y	Ever and last month Unspecified	Premenstrual Syndrome – physical and affective Yes
8. Missmer & Bove United States	2011 33%	SCQ Support group	61% Sufferers	Massage, herbs, acupuncture, chiropractic Unspecified	94 16 – 58y	Unspecified Unspecified	Endometriosis leg pain Yes

N/A - Not Available SCQ - self-completed questionnaire EPO - Evening Primrose Oil *Calculated Sx - Symptoms

Table 2.3 continued

First Author Country	Year / Resp. rate	Design/ Sample	Max. CAM Prevalence/ Baseline	CAM Therapies used/ List supplied?	Sample size/ Age range	Time frame reported / CAM self-prescribed	Symptoms treated/ Validated diagnostic assessment
9. Kupperman et al. United States	2007 75%*	Interviewer Multiple clinics	36.4% Sufferers	Acupuncture, herbs, dietary supplements Yes - limited	1493 31 – 54y	Current or prior (Ever use) Unspecified	Pelvic problems – physical and affective Yes
10. Chia et al. Hong Kong	2013 94%*	SCQ 1 site- tertiary students	62% 7% Sufferers	Warm beverage Dietary supplements, TCM Yes	240 18 -22y	Last 6 months Yes	Dysmenorrhoea Unspecified
11.Sternfeld et al. United States	2002 26%	SCQ HMO (telephone)	20.1% Sufferers	Dietary supplements, massage, mind-body, herbs Yes – limited?	1194 21 – 45y	Last 12 months Unspecified	Premenstrual Syndrome – physical and affective Yes
12. Borah et al. United States	2013 23%*	SCQ Commercial database (on-line)	26% Self-carers	"Herbs, supplements or other CAM" Unspecified	968 29 -59y	Unspecified Yes	Fibroids Yes
13.Gold et al. United States	2007 100%	SCQ & interviewer SWAN cohort	48.7% Whole sample	General CAM Yes- limited	3013 42 – 52y	Last 12 months Unspecified	Premenstrual Syndrome – physical and affective Unspecified
14. Ohde et al. Japan	2008 97.4%	Prospective diary National database	7.7% Sufferers	Dietary CAM Yes - limited	823 18 – 51y	Last month Unspecified	Dysmenorrhoea Yes
15. Tariq et al. Pakistan	2009 N/A	SCQ & Interviewer Multiple sites – hospital students, staff/patients	32% Sufferers	Household remedies, herbs, homeopathic Unspecified	1236 16 – 50y	Unspecified Unspecified	Dysmenorrhoea Unspecified
16. Abdul-Razzak et al. Jordan	2010 N/A	SCQ 1 site- tertiary students	21.3% Sufferers?	Herbs (supplement-users excluded) ? limited if yes	127 19 – 24y	Unspecified Yes	Dysmenorrhoea Unspecified
17. Cheng Taiwan	2011 95.4%	SCQ 1 site- nursing students	69.7% Treatment users	TCM, herb tea Yes	2758 18 – 55y	Last cycle Unspecified	Dysmenorrhoea Yes (by author)

N/A - Not Available SCQ - self-completed questionnaire EPO - Evening Primrose Oil *Calculated Sx - Symptoms

Table 2.3 continued

First Author Country	Year / Resp. rate	Design/ Sample	Max. CAM Prevalence/ Baseline	CAM Therapies used/ List supplied?	Sample size/ Age range	Time frame reported / CAM self- prescribed	Symptoms treated/ Validated diagnostic assessment
18. Cheng & Lin Taiwan	2011 98%	SCQ 2 sites - tertiary students	35% freq Sx 23.9%* all Sx Sufferers	TCM, herb tea Yes	616 18 – 28y	Last 12 months Yes	Dysmenorrhoea Yes
19. Pan et al. Taiwan	2014 N/A	Data from national health database	53.4% Sufferers	TCM, herbs, acupuncture N/A	23118 menarche- 50y	5-year use No	Dysmenorrhoea Yes
20. Eladawi et al. Egypt	2014 93.7%	SCQ 1 site - tertiary students	43.7% Sufferers	Hot drinks, herbs, massage Unspecified	797 17 – 31y	Last year Unspecified	Mastalgia Yes
21. Tanaka et al. Japan	2014 75%*	SCQ Commercial DB (on-line)	13.9% Outpatients	TCM Unspecified	274 15 – 49y	Last 3 months No	Dysmenorrhoea, fibroids, PMS - physical & affective, endometriosis Yes
22. Cronje & Kritzinger South Africa	1991 78.5%	SCQ 1 site -tertiary students	1.0%* Whole sample	Homeopathy Unspecified	102 19 – 21y	Unspecified Unspecified	Dysmenorrhoea No
23. Leather et al. United Kingdom	1993 N/A	SCQ 1 site - PMS clinic	92% Sufferers	Vit. B6, EPO, zinc, magnesium Unspecified	100 18 – 45y	Ever used Yes	Premenstrual syndrome Yes -GP referred
24. Adegbesan et al. Nigeria	2014 N/A	Interviewer 2 sites - hospital clinics	37.3% Sufferers	Herbs, cod liver oil Unspecified	300 20 – 49y	Unspecified Unspecified	Fibroids Yes
25. Brito et al. Brazil	2012 N/A	? Prospective study 1 site -tertiary students	16% Sufferers	Teas,massage Unspecified	634 18 – 53y	Unspecified Unspecified	Dysmenorrhoea No

N/A - Not Available SCQ - self-completed questionnaire EPO - Evening Primrose Oil *Calculated Sx - Symptoms

Table 2.3 continued

First Author Country	Year / Resp. rate	Design/ Sample	Max. CAM Prevalence/ Baseline	CAM Therapies used/ List supplied?	Sample size/ Age range	Time frame reported / CAM self-prescribed	Symptoms treated/ Validated diagnostic assessment
26. Hylan et al. United Kingdom, United States, France	1999 N/A	Interviewer by telephone Commercial database	23% Sufferers	Non-prescription medicines included EPO & OTC drugs Unspecified	1045 18 – 49y	Current Unspecified	Premenstrual Syndrome - physical and affective Yes
27. Kraemer & Kraemer United States	1998 70**%?**	SCQ Recipients of pharmacy newsletter	Ever -91.4 Last yr -62.5% Sufferers	Vitamin/mineral Vitamins, minerals, EPO Unspecified	220 26 – 56y	Ever and Last 12 months Unspecified	Premenstrual Syndrome Yes
28. Brown & Zimmer United States	1986 N/A	SCQ Attendees at talk on PMS	12% Sufferers	Chiropractor, nutritionist, osteopath, clergy Unspecified	83 18 – 43y	Unspecified No	Premenstrual Syndrome No
29. Hamaideh et al. Jordan	2014 73%	SCQ 1 site - tertiary students and employees	24.4% 53.5% Whole sample	Cinnamon tea/supplements hot fluids? Yes	254 18 – 45y	Unspecified - “usually used” Yes	Premenstrual Syndrome PMDD-physical and affective Yes
30.Seven et al. Turkey	2014 94%*	SCQ 1 site - Volunteer tertiary students	34.3% Sufferers	Massage, herb tea Unspecified	371 18 – 23y	Unspecified Unspecified	Dysmenorrhoea Yes
31. Sharma et al. India	2008 89.3%	Interviewer 1 site- tertiary students	40%/?	Home remedies, Ayurvedic or homeopathic medicine Unspecified	100 17 – 23y	Last 3 months Unspecified	Cyclic Perimenstrual Pain and Discomfort No
32. Chawla et al. United States	2002 51.6%	SCQ – prospective study HMO- Randomly selected	?Likelihood Sufferers	General alternative medicine provider Unspecified	1194 21 - 45y	Last 12 months Practitioner	Premenstrual Syndrome and PMDD (affective) Yes

N/A - Not Available SCQ - self-completed questionnaire EPO - Evening Primrose Oil *Calculated Sx – Symptoms

Table 2.3 continued

First Author Country	Year / Resp. rate	Design/ Sample	Max. CAM Prevalence/ Baseline	CAM Therapies used/ List supplied?	Sample size/ Age range	Time frame reported / CAM self-prescribed	Symptoms treated/ Validated diagnostic assessment
33. Cox et al. Australia	2003 65%	Focus group National sufferers	98.4%* Sufferers	Various Unspecified	61 20 - 64 y	Unspecified Unspecified	Endometriosis Yes
34. Sawalha et al. Palestine	2008 98.6%	SCQ 1 site- tertiary students	33.9% Mixed gender	Herbal medicine Unspecified	1581 17 – 24 y	Unspecified Yes	General health issues included dysmenorrhoea No
35. Nicholson New Zealand	2006 97.2%	SCQ 1 hospital site	38.1% E.D. patients	General excl. Vitamin/mineral supplements Unspecified	1043 14 – 97 y	Unspecified Mixed	General health issues included dysmenorrhoea No
36. Critchley et al. Hong Kong	2005 N/A	Interviewer 1 hospital site Preoperative patients	90% 44% Mixed gender	Chinese herbs in soup/tea Practitioner prescribed Yes	259 14 – 96 y	Last 12 months Mixed	General and gynaecology Included fibroids No
37. Byles et al. Australia	1997 60%	Focus group Survey sample of sufferers from 1 state	N/A Sufferers	General alternative medicine Unspecified	31 33 – 50 y	Unspecified Unspecified	Cyclic Perimenstrual Pain and Discomfort Unspecified
38. Baines et al. Australia	2007 68%	SCQ Longitudinal study on dietary habits	26.2% Whole sample	Alternative health practitioner Unspecified	9113 22 - 27 y	Last 12 months No	Various menstrual symptoms No
39. Chen et al. Taiwan	2006 N/A	Focus group 1 site –Medical school	N/A Sufferers	Various CAM therapies Unspecified	23 16 – 19 y	Unspecified Yes	Dysmenorrhoea Unspecified

N/A - Not Available SCQ - self-completed questionnaire EPO - Evening Primrose Oil *Calculated Sx – Symptoms

Table 2.3 continued

First Author Country	Year / Resp. rate	Design/ Sample	Max. CAM Prevalence/ Baseline	CAM Therapies used/ List supplied?	Sample size/ Age range	Time frame reported / CAM self-prescribed	Symptoms treated/ Validated diagnostic assessment
40. AlBraik et al United Arab Emirates	2008 N/A	Interviewer and SCQ 1 site health clinic	76% 38% 34% Mixed gender	Herbal medicine ever Herbal medicine current Herbal practitioner ever Unspecified	330 15 – 55+ y	Last 6 months and current Mixed	General health issues included dysmenorrhoea No
41. Awad & Eltayeb Sudan	2006 83.3%	SCQ 3 cities random stratified	53.5% Mixed gender	Herbal medicine Unspecified	1000 20 – 60+ y	Last 2 months Yes	General health issues including dysmenorrhoea No
42. Hsieh et al. Taiwan	2008 N/A	2004 records National Health database	28.1% Mixed gender	Chinese Medicine Yes	166929 0 – 76+ y	Last 12 months No	All health issues including menstrual disorders Yes
43. Chapple United Kingdom	1999 N/A	Focus group Local interest groups with snowball sampling	10%? Sufferers	EPO and homeopathy Unspecified	30 15 – 53 y	Unspecified Unspecified	Menorrhagia No
44. Kronenberg et al. United States	2006 69 – 79%	Interviewer by telephone Commercial database	64.4% All women	Variety of CAMs and CAM practitioner used Yes	3068 18 – 50+ y	Last 12 months Unspecified level incl. practitioner use	General health issues including fibroids No

N/A - Not Available SCQ - self-completed questionnaire EPO - Evening Primrose Oil *Calculated Sx - Symptoms

last three decades. Nevertheless, the papers reviewed do provide important confirmation of the substantial use of different CAM for a variety of CPPD and that CAM attracts high levels of perceived efficacy amongst users with CPPD. Review of the contemporary empirical literature also highlights the dearth of knowledge around a number of issues relating to CPPD and CAM use. Indeed, future empirical study is needed to help investigate the CPPD issues for which women are using particular CAM, the profile of these women, reasons for their CAM choice and whether indeed the CAM has been a beneficial treatment. The simultaneous use of conventional medicine and CAM raises unknown safety concerns regarding interactions and adverse reactions (Izzo, 2012) generally and is unexplored for this group of women. Arising from the practice of self-prescribing CAM are issues of suitability, levels for safe and/or effective dosage and treatment duration. Past concern over potential neurotoxicity with high-dose vitamin B_6 (Wyatt et al., 2002) should serve as a reminder that although CAM is natural with misuse it has the potential to cause harm. Finally, although cross-sectional studies may indicate prevalence of CPPD and CAM use they do not unequivocally establish causality. Clear, safe, reliable information on effective treatments, and most importantly the profile of users, would help inform both providers and women with CPPD towards evidence-based, co-ordinated care and treatment choices.

2.3.5 Conclusion

CPPD problems are widespread and its treatment appears to be either poor and/or professionally unsupervised. To contribute to more effective strategies to remedy this situation large-scale, national studies, including prospective, placebo-controlled studies on women with similar CPPD symptoms are much needed to determine CAM efficacy and safety. Further, future studies are also required, which addresses the characteristics of women who choose to use CAM, their motivation for doing so and their reasons for preferring self-treatment It is important for health providers at all levels to have a solid evidence base for prescribing treatments for CPPD and this requires the provision of good quality, reliable data.

2.4 Chapter summary

This chapter has presented a review of the information available on the use of CAM by women who suffer with symptoms of CPPD thereby providing an initial understanding of this topic from which to develop more in-depth research in Australia and elsewhere. Specifically, the differential uptake of CAM products and practitioners for specific CPPD symptoms were analysed for their prevalence of use and perceived efficacy by women. The demographic characteristics of women, as well as their attitudes and motivations for CAM use, and the sources responsible for CAM recommendations were examined.

The following Chapter will describe the samples, methodology, and statistics used to analyse data from two specialized databases. The first database is that of Australian women and their health, the Australian Longitudinal Study of Women's Health (ALSWH), that will examine women's CPPD symptoms and their use of CAM therapists, products and therapies. The second is the Practitioners Research And Collaboration Initiative (PRACI) database, a practice-based research network, regarding the perspective of practicing Western herbalists in treating women with CPPD.

3. Research design and methodology

This chapter is intended to provide a general overview of the methodology used in the thesis. Where relevant, each chapter contains additional information on the specific methodology related to that section.

3.1 Chapter introduction

This chapter describes the survey databases, study designs, statistical methodologies, data handling and ethical considerations associated with the analyses sections of the thesis. This project drew on two research studies the Australian Longitudinal Study on Women's Health, and *Western herbal medicine consultations for common menstrual problems; practitioner experiences and perceptions of treatment* derived from the Practitioner Research And Collaborative Initiative (PRACI). Both were established in Australia - ALSWH represents the largest project of its kind in Australia and PRACI is the largest database of its type worldwide.

3.2 Cross-sectional studies

Cross-Sectional study design was used to achieve the aims of this research. Cross-sectional studies are an ideal tool for measuring behaviour in normally distributed populations and include descriptive measures and prevalence of health-related issues in quantitative terms. They also allow for the analytic measurement of association between measured variables (Webb, Bain, & Pirozzo, 2005). Cross-sectional studies are a common starting point for formulating hypotheses and for an initial exploration of associations between variables in a new area of research. They aid scientific understanding partly by defining the scope of a problem and/or behaviour but also through quantitative analyses of treatment strategies that may be outside the purview of normal medical clinical study (Webb et al., 2005). This

type of study can access valuable, real-life, large-scale information not feasibly or practically attainable in any other way and is relatively easy and inexpensive to collect, particularly when using self-completed questionnaires (Ligthelm et al., 2007). Importantly, the outcomes can also help direct healthcare policy.
By using representative samples of the population in cross-sectional studies, researcher bias, whether conscious or not, is avoided. However, the decision by those contacted to participate in this type of study risks selection bias as the personal or demographic characteristics, such as educational level or race, of participants may differ from those of non-participants (Harrison & Cock, 2004). Also, data collected through self-completed questionnaires on health issues have potential inaccuracies. These may arise from variations in participants' understanding of health terms (e.g., what constitutes PMS); differences in thresholds of tolerance around health problems such as pain; and differences in cultural beliefs may affect women's experience of CPPD (Lee, A. M. et al., 2009). Furthermore, whilst associations of variables can be tested statistically they are not conclusively causal, and non-responders to surveys can alter the representativeness of the sample data (Harrison & Cock, 2004). A further problem can arise if the survey is conducted retrospectively, which is the most economical, convenient and commonplace method, as data are then subject to recall bias (Webb et al., 2005).

3.3 Australian Longitudinal Study on Women's Health

3.3.1 Aims of the ALSWH

ALSWH is the largest, government-funded project of its kind, focusing on women's health in Australia (ALSWH, 2018). It comprises over 58,000 women representative of the country's adult female population, grouped into three specific age groups, and tracks key aspects related to their health (Brown, W. et al., 1996). The ALSWH is internationally respected for its comprehensive methodology (ALSWH, 2018) and data derived from the study are intended to provide a national and international resource that ultimately furthers the understanding of matters associated with

women's health (Brown, W. et al., 1996). The data importantly inform decision makers, at both federal and state levels, of the most effective health policies to achieve improvements in women's health (Brown, W. et al., 1996).

3.3.2 The ALSWH Methodology

Beginning in 1996, and thereafter at three-year intervals, survey participants were mailed questionnaires for self-completion, gathering data on their demographics, lifestyle, family situation, healthcare use and mental and physical health issues. Information collected is intended to trace longitudinal changes for participants as they mature over a 20-year period. The ALSWH has allowed for variations in the frequency of data collection and question content to gather additional data according to specific sub-study needs.

3.3.3 The ALSWH Sample

The ALSWH sample was originally derived from Australia's Medicare database which was a register of all Australian citizens and residents. A random sample of women, across three specified age groups 'young' (18 - 23 years), 'mid-aged' (45 - 50 years) and 'older' (70 - 75 years), was invited to participate. Women in rural and remote geographical areas were over-sampled to ensure sample sizes were statistically sound (Brown, W. J., Dobson, Bryson, & Byles, 1999b). A comparison of the demographic profile of the ALSWH sample and that of the census data of the same year, 1996, is shown in Table 3.1. As can be seen this verifies that the sample is broadly representative of the population for the age group of interest in this thesis; those aged 18 - 23 years (Brown, W. J. et al., 1999b).

Due to uncertainty surrounding the accuracy of the original source Medicare data, initial response rates were estimated, however the need for confidentiality has meant that ALSWH organizers were unable to follow-up non-responders as no

names and addresses were disclosed to them. However, using aggregate data from the Medicare database about non-responders, their use of health services did not differ from that of responders in the young cohort (Brown, W. J. et al., 1999b). Based on the 1996 census data it is possible though that in the young age group those women with higher education levels are over-represented in the ALSWH sample whilst women of Asian and other racial groups may be under-represented (Brown, W. J. et al., 1999b). It is estimated that the response rate for this age group from the original Medicare database was around 41% - 42%, which was assessed by the ALSWH investigators to be in accord with other longitudinal postal surveys (Brown, W. J. et al., 1999b).

Response rates for the 2006, 2009 and 2012 surveys were 68%, 62% and 62% respectively (see Table 3.2) which is considered acceptable given the length of the study and the mobility of this age group of women. Within this age range women would be expected to be mobile due to their seeking work and/or overseas experience and also because marriage results in 'loss' of contact from name changes (ALSWH, 2018).

3.3.4 CPPD and CAM use

The data relating to the young age cohort at ALSWH's inception has been used in all analyses in this thesis as they represent women at a time in their reproductive lives, within the age range 21-35 years, when cycles are expected to be at their most regular (Dovom et al., 2016).

A quantitative analysis of Australian women's prevalence of CPPD symptoms and CAM practitioner consultations and self-prescribed CAM use was based on data collected from the young cohort using the 2012 survey (Section 4.3). Data from 2006, 2009 and 2012 were included in the longitudinal analyses which examined changes in this cohort of women's use of individual CAM therapists, therapies and products and associated CPPD (Section 5.3). Note that before the 2006 survey, the

Table 3.1 Demographic data as a percentage of the young cohort from 1996 for ALSWH and from Census information. Table derived from Brown et al. (Brown, W. J. et al., 1999b)

Number of women aged 18 – 25 years old	**ALSWH (N=**14,762)	**Census%** (N=759,680)
Main current employment status		
Employed full-time	31.3	32.4
Employed part-time	19.2	26.4
Worked (without pay)/ employed (other)	1.9	1.3
Unemployed	6.4	10.5
Total not in labour force	39.4	26.3
Not stated	1.8	2.7
Highest qualification completed		
No post-school qualification	69.8	69.3
Trade/Apprenticeship	2.4	7.9
Certificate/Diploma	15.1	6.0
University Degree	12.1	7.7
Other (not stated, inadequately described)	0.6	9.1
Aboriginal/Torres Strait Islander		
Non indigenous	97.9	94.9
Aboriginal or TSI	1.6	2.7
Not stated	0.5	2.5
Country of birth		
Australia	88.6	77.8
Other English speaking	3.5	4.1
Other Europe	1.3	1.6
Asia	3.6	10.6
Other/not stated	3.0	6.0

Table 3.1 continued

Present marital status		
Married	8.2	9.0
Separated/divorced	0.0	1.1
Widowed	0.0	0.2
Never married	79.0	89.8
De Facto (not collected by ABS)	12.0	-

different CAM were not categorized individually but enquired into as a group only, therefore early data could not be included in the longitudinal analysis.

The questions in the surveys that related to CPPD symptoms were: having been diagnosed with endometriosis in the last 3 years, requiring a box to be ticked if the answer was "yes'; and the frequency with which premenstrual tension, irregular periods, heavy periods and severe period pain had been experienced in the

Table 3.2 Participation and retention of 14,247 women in the 1973-78 cohort of women who were 18-23 years old at the first survey in 1996

Survey **Age in years**	**Survey 2** **22-27**	**Survey 3** **25-30**	**Survey 4** **28-33**	**Survey 5** **31-36**	**Survey 6** **34-39**
Deceased	22	33	50	58	77
Frailty (e.g. intellectual disability)	3	9	12	15	16
Withdrawn	230	518	800	951	1157
Total ineligible	255	560	862	1024	1250
Contacted but did not return survey	1332	653	1371	1994	1454
Unable to contact participant	2972	3953	2869	3029	3533
Total non-respondents	4304	4606	4240	5023	4987
Respondents completed survey	9688	9081	9145	8200	8010
Eligible at current survey	13,992	13,687	13,385	13,223	12,997
Response rate as % eligible	69.2%	66.3%	68.3%	62.0%	61.6%

previous 12 months, where the response options available were ‘never’, ‘rarely’, ‘sometimes’ or ‘often’.

Questions regarding CAM use were divided between having consulted either a CAM therapist or having used a CAM product or practice for their own health, in both cases relating to the previous 12-month period. The list of CAM practitioners included: chiropractor, osteopath, massage therapist, acupuncturist, naturopath/herbalist, and ‘another alternative’ health practitioner, where either a box for ‘yes’ or ‘no’ could be ticked. The CAM therapies included: vitamins/minerals, yoga/meditation, herbal medicines, aromatherapy oils, Chinese medicine and ‘other alternative practices or products’, where response options were regarding frequency of use, being ‘never’, ‘rarely’, ‘sometimes’ and ‘often’. Women who were not menstruating because they were knowingly pregnant or had recorded having a bilateral oophorectomy were excluded from the analyses.

3.3.5 Statistical considerations for ALSWH data

Confounding variables that were identified as potentially able to have affected the association between CAM use and CPPD and which were routinely collected in the surveys related to demographic and co-morbidity factors. The demographic factors included:

- area of residence from the postcode data – ‘urban’ or ‘rural/remote’;
- educational status - ‘no formal qualifications’, ‘year 10 or equivalent (e.g. school certificate)’, ‘year 12 or equivalent (e.g. higher school certificate)’ or ‘trade /apprenticeship’ or ‘certificate/diploma’ or ‘university degree’;
- ability to manage on income - ‘it is impossible’ or ‘it is difficult all of the time’ or ‘it is difficult some of the time’ or ‘it is not too bad’ or ‘it is easy’; and
- marital status – ‘never married’ or ‘married/de facto’ or ‘separated/ widowed’.

The co-morbidities that had been diagnosed or treated in the last three years included:

- insulin-dependent (Type 1) diabetes;
- non-insulin dependent (Type 2) diabetes;
- low iron (iron deficiency or anaemia);
- depression;
- anxiety disorder;
- asthma;
- 'other cancer' (other than skin cancer); and
- hypertension.

In the longitudinal study covering surveys 4 (2006), 5 (2009) and 6 (2012) additional confounding variables were included in the analyses:

- BMI calculated from height and weight data and categorised as 'underweight (<18.5kg/m^{2}'), 'normal (18.5-<25.0kg/m^{2}'), 'overweight (=>25-<30 kg/m^{2}') or 'obese (=>30 kg/m^{2}');
- Contraceptive use based on use of one of a variety of methods of female hormone supplementation 'yes' or 'no';
- Parity relating to live births was categorised as 'none' or '1-2' or '3 or more';
- Stress related to that felt in the last 12 months and involving 11 life domain items. It was categorised as 'Not applicable/Not at all stressed', 'Somewhat stressed', 'Moderately stressed', 'Very stressed' or 'Extremely stressed';
- Exercise level calculated using an algorithm based on time engaged in various activities and categorised as 'Sedentary', 'Low', 'Moderate' or 'High' (ALSWH, 2018); and
- Ethnicity defined according to country of birth as 'Australian', 'Other English-speaking background', 'European', 'Asian' or 'Other'.

In addition, women who had been diagnosed with cancer in the previous three years were excluded altogether from analyses.

3.3.6 Data collection and management for the ALSWH

For the ALSWH, completed questionnaires were mailed back by participants in pre-paid envelopes to the ALSWH office for data entry. Scanned images of the data were processed using Optical Mark Recognition using two different levels of mark recognition to ensure data capture was internally consistent and any discrepancies were resolved by ALSWH staff. A review of outliers was used to check for potential errors. All data was stored on a secured device.

3.4 The Practitioner Research And Collaborative Initiative (PRACI)

3.4.1 Aims of PRACI

Initiated in 2014, PRACI is a practice-based research network (PBRN), servicing 14 different CAM modalities (Steel, Adams, & Sibbritt, 2014). PBRNs are defined as a group of ambulatory practices that together collaborate with academic institutions in the interest of providing clinically relevant research based on practitioners and patients and intended to improve care quality (Westfall, Mold, & Fagnan, 2007). The proportion of complementary therapists within the professional groups represented by PRACI is indeterminable as there are no statutory registers and professional registers are not necessarily up-dated regularly. In addition, many CAM practitioners do not register with a professional body or may practice more than one type of CAM and therefore belong to multiple registers (Grace, 2012; Steel et al., 2017).

PRACI was specifically established to promote and facilitate co-operation between complementary therapists and researchers with the aim of developing high-quality rigorous and clinically relevant research using sustainable networks in an area where this had been absent (Steel et al., 2014). The CAM field, typically lacks good quality research and trained CAM researchers (Adams, 2008) and/or those

practitioners that feel competent to carry out research. This lack is in spite of these same practitioners acknowledging the importance of research to the development of their profession (Steel et al., 2015). This likely represents a circular problem, where a lack of acceptable, scientific research has precluded sufficient funding that would enable further improvements to CAM research capacity, design and methodology (Roufogalis, 2015; Wardle, J. & Adams, 2013).

By bridging this deficit, both practitioners and the public, are enabled to enhance their relevant knowledge of the practice and efficacy of individual CAM therapies for treating particular health issues. Importantly, good quality research provides not only improved and credible healthcare for the public but also for healthcare providers (Steel et al., 2014). In Australia, CAM professions have relatively small and poorly funded networks and their capacity to carry out research is therefore severely hampered. By combining CAM modalities under the PRACI authority, economies of scale are enabled and vital research has become viable.

3.4.2 Design of PRACI

The initial phase of PRACI involved assessing the practitioner numbers and settings of members nationally in each CAM modality included in its scope. These modalities are acupuncturists, aromatherapists, Ayurveda practitioners, Bowen therapists, Chinese herbalists, homeopaths, kinesiologists, massage therapists, musculoskeletal therapists/myotherapists, naturopaths, nutritionists (non-dietetic), reflexologists, Western herbalists, and yoga teachers. Following the initial groundwork, the demographics of the practitioners and their practices were collected.

3.4.3 The PRACI sample

All known members of CAM modalities included under PRACI's remit were initially invited to participate in on-going PRACI studies. The initial baseline survey was completed by 1264 practitioners and of those 764 actually signed up to participate

in PRACI activities (Steel et al., 2017). Participants completed a more detailed survey regarding their practices and themselves and they have formed the database sample from which further research on specific therapies or the CAM professions as a whole is directed. A statistical assessment of the demographics of participants and non-participants, including age, gender, geographical location in Australia and urban/rural divide as well as years of practice, has confirmed that there is no significant difference between them. The mean age of PRACI members was 48 years and the gender split 76% female to 24% male (Steel et al., 2017).

There were 95 PRACI WHs registered in 2017. The most significant demographic difference amongst PRACI members and PRACI WHs related to geographical locations. Most PRACI WHs resided in either New South Wales (36.8%) or Queensland (23.2%) with Victoria (16.8%), South Australia (10.5%) and Western Australia (7.4%) having much lower representation (Steel et al., 2017). The respective representation for all PRACI members across these same regions was 22.8%, 24.6%, 34.7%, 5.8% and 8.6%. Urban practices made up 82.5% of WH practices. Women's health was rated as the second most common area of practice interest for WHs (Steel et al., 2017). Table 3.3 shows comparable demographic details of practitioners from a survey of National Herbalists Association of Australia practitioners surveyed in 2013 (Leach, M. J., McIntyre, & Frawley, 2014) and those of the PRACI WHs who responded to the survey conducted in 2016 - 2017. The main differences between the two samples are the higher proportion of men, higher proportion of older practitioners, lower level of professional educational qualifications and the greater the number of weekly patient-visits amongst the PRACI members compared to the NHAA survey sample. Differences may be due to changes over time, the very different sample sizes and the willingness of members with bigger client bases to participate in the PRACI survey.

3.4.4 PRACI and the CPPD sub-study

A 51-question survey was specifically developed to enquire into multiple aspects of the treatment and perceptions of WHs of PMS, heavy and irregular periods and period pain. (See Appendix 2)

The questionnaire covered practitioner demographics, practice details, details of the treatment of menstrual problems, interaction with other health professionals concerning this specific treatment and perceptions about the behaviour of women with menstrual problems regarding treatment.

All 98 PRACI participants registered at the time as practicing herbal medicine were invited, as part of this thesis' enquiry to participate, in an on-line survey in November 2016. Six invites were returned as undeliverable. A reminder to complete the survey was issued in December 2016 and the survey was closed in February 2017, after receiving 40 responses. Thus, the final response rate was 43.5%.

Table 3.3 Comparison of Western Herbalists from NHAA database and survey participants

	NHAA WHs[#] Number (%)	PRACI WHs Respondents Number (%)
Gender		
Female	346 (86.7)	29 (72.5)
Male	53 (13.3)	11 (27.5)
Age		
21 - 30	28 (7.0)	0 (0)
31 – 40	98 (24.6)	6 (16.7)
41 – 50	111 (27.8)	10 (27.7)
51 – 60	113 (28.3)	15 (41.7)
> 60	49 (12.3)	5 (13.9)
Qualification		
No qualification	3 (0.8)	1 (0.3)
Certificate	110 (27.6)	23 (57.5)
Undergrad degree	148 (37.1)	7 (17.5)
Postgrad degree	138 (34.6)	9 (22.5)
Clinic Location		
Urban	188 (63.3)	29 (72.5)
Rural	109 (36.7)	14 (35.0)*
Number of consultations/week		
< 5	227 (78.3)	5 (12.5)
6 – 10	42 (14.5)	12 (30.0)
>10	21 (7.2)	23 (57.5)

Length of initial consultation		
<45	15 (5.2)	2 (5.0)
46 – 60	121 (41.7)	20 (50.0)
61 – 75	93 (32.1)	3 (7.5)
76 – 90	46 (15.9)	13 (32.5)
>90	15 (5.2)	2 (5.0)
Length of follow up consultation		
<15	4 (1.4)	0 (0.0)
16 – 30	98 (33.8)	17 (42.5)
31 – 45	110 (37.9)	9 (22.5)
46 – 60	69 (23.8)	14 (15.6)
> 60	9 (3.1)	0 (0.0)

[#] Data from Leach et al. (Leach, M. J. et al., 2014)

***** Some practitioners had clinics in both urban and rural locations therefore numbers are greater than 100%

3.4.5 Data collection and management for PRACI

Data for the PRACI survey into menstrual problem treatment by WHs was collected anonymously on-line by a single researcher and all data was stored on a secure device.

3.5 Statistical analysis

The statistical measures that were used for the ALWSH data and that of PRACI differed due to the very different sample sizes. However, for both sets of data analyses the statistical significance was set at the $\alpha = 0.05$ level and data was analysed using the statistical package STATA 14.2 (STATA Corp LLC).

3.5.1 Descriptive statistics

For the ALSWH studies the binary variables for PMS, heavy periods, irregular periods and severe period pain of sufferers and non-sufferers were created. Those

women who ‘sometimes' or ‘often' experienced a symptom were considered sufferers whereas those who' rarely' or ‘never' experienced the symptom were non-sufferers. Endometriosis was already coded as having had a diagnosis (a sufferer) or not. Prevalence values were then calculated for each menstrual condition suffered and for the use of CAM practitioner or therapies and products by sufferers and non-sufferers with 95% confidence intervals.

3.5.2 Bivariate analyses

The association between variables was calculated using chi-square tests for the large ALSWH sample data, Fisher’s exact test or Wilcoxon rank sum as appropriate for the small PRACI sample data.

3.5.3 Multivariate analyses

For the ALSWH data logistic regression models were used to determine the magnitude of association between CPPD symptom and CAM practitioner or therapy use, with adjustment for confounding variables. Multivariate regression analysis was used to find the best fitting and most parsimonious model. Longitudinal regression modelling was conducted using generalised estimating equations (GEEs) (STATA 2011). GEEs are an extension of generalised linear models that allow for the analysis of data longitudinally and reflect the relationship between the longitudinal development of the association between CPPD symptom and CAM practitioner or CAM therapy and product use over the different survey timeframes. The reason why a GEE was chosen to analyse the longitudinal data is that standard longitudinal analysis techniques include traditional models based on ordinary least squares (OLS) estimation, such as repeated measures analysis of variance. However, traditional OLS models require complete data and so for cases with missing data, a subject’s entire record is dropped from analysis. GEE models on the other hand, does not drop a subject’s entire record if there is missing data but analyses the available data

(Twisk, JWR., 2003). This modelling takes account of the inter-dependency of CAM use by an individual at the different time periods. All data was included in analyses using STATA 14.2 (PR.Com, 2015).

3.6 Ethical considerations

Ethics approval from ALSWH was granted from the Human Ethics Committee to the University of Newcastle, under which, as a sub-study, this research is undertaken and for which the ALSWH PSA committee approval, EoI ID #A549, was granted on 29th January 2015.

The initial PRACI project was approved by the Human Research Ethics Committees for the University of Technology Sydney (#2014000390) and Endeavour College of Natural Health (HREC#2014033). Ethical approval for the survey of WHs and the treatment of menstrual problems was granted by the Human Ethics Committee at the University of Technology Sydney (UTS HREC ETH16-0534). The PRACI approval number for this sub-study of WHs was 20160727.

All participants in both ALSWH and PRACI had their records de-identified and no personal data was accessible. For each survey participants were specifically requested to consent to, and sign-off on their participation. The WH survey consent to participate was implied by survey completion with no penalty or compulsion on any of the participants to complete all questions within the survey.

3.7 Chapter summary

This chapter has provided details of the origins and aims of datasets on which information has been analysed and synthesised in the following chapters. It has also presented the selection criteria for both databases, the methodology used in

sampling and data collection as well as statistical analysis, data handling and storage and ethical considerations relating to their use.

The following chapter will examine the use of CAM by women with CPPD from the 2012 survey of the ALSWH database.

4. The use of complementary and alternative medicine by 7,427 Australian women with cyclic perimenstrual pain and discomfort.

4.1 Chapter introduction

Following the extensive literature review into CAM use for CPPD presented in Chapter 2, it is apparent that women worldwide are using CAM to treat their menstrual issues. This chapter describes the study that further explores this topic and in particular, the gaps that emerged following the literature review. Much of the CAM usage for CPPD, as described in Chapter 2, is centred around two main menstrual issues – PMS and dysmenorrhoea. This earlier research focuses on self-prescribed CAM with little analysis of CAM practitioner use. Furthermore, countries in which CAM is used within mainstream healthcare have a wider perspective on CAM's utility in treating menstrual problems. There is, however, a dearth of current information available on this topic emanating from Western countries, and limited opportunity to monitor either prevalence or effect apart from the few CAM modalities such as osteopathy, acupuncture and chiropractic which may have become integrated into official health records. The majority of CAM use remains 'unofficial', not linked to any clinical audit and therefore beyond an analysis of the conditions and outcomes for which they may have been adopted. Since 2000 there have only been twelve studies published in English on the use of CAM specifically for CPPD by women in the age range 30 -40 years old, based on a sample size of 500 or more. Of these only five were conducted in a Western country, specifically the USA (Borah et al., 2013; Chawla et al., 2002; Gold et al., 2007; Kuppermann et al., 2007; Sternfeld et al., 2002).

To address the gap in knowledge about Western women's current use of CAM for menstrual issues, this study examines the contemporary prevalence of four main CPPD issues amongst Australian women and their differential use of CAM, by CPPD symptom, based on data from women within the 2012 tranche of the ALSWH survey. The study, therefore, updates information on CAM use by women within a large representative sample, illustrative of behaviour in higher income countries, and concerning a broader range of menstrual issues than has so far been examined.

4.2 Background

The sample chosen for this particular study was the young cohort from the ALSWH who were aged 18 to 23 years at ALSWH's inception. As described in Chapter 3, ALSWH is a longitudinal study and the data presented here were gathered during the 2012 survey when women in the young cohort were aged between 34 and 39 years. The rationale for the choice of this particular age group is that between 25 - 40 years of age, menstrual cycles are much more likely to be regular (Sherman & Korenman, 1975). That is, for women in this age group, menstruation is much more likely to have settled into a regular, ovulatory pattern. At the start of menstruation, in puberty, when cycles are being established and at menopause when ovulation may not occur every cycle or egg maturation is irregular, menstrual patterns exhibit greater variation (Sherman & Korenman, 1975). Australian statistics from 2015 found the highest fertility rates were for women aged 30 - 34 years old, followed by those for 25 - 29 year-olds (Australian Bureau of Statistics, 2016).

Whilst women are known to be high users of CAM (Barnes, P. M. et al., 2009; Clarke et al., 2015; Klein et al., 2015), there are other factors known to influence the adoption of CAM, as previously highlighted in Chapter 1. The demographic factors previously identified as significantly contributing to CAM use are urban/rural setting which can affect the type of CAM chosen (Adams, Sibbritt, et al., 2013); marital status which shows a somewhat mixed picture (possibly being country-specific as outlined in Section 1.5.6.) but in Western countries, amongst women who were divorced, separated or widowed CAM use appeared to be higher (Kristoffersen et al., 2014; Messerer et al., 2001; Oldendick et al., 2000; Williams et al., 2011); income level especially in countries where CAM is an out-of-pocket expense which covers most CAM in Australia (D'Onise et al., 2013; MacLennan et al., 2006; Williams et al., 2011); and educational attainment (Barnes, P. M. et al., 2009; Klein et al., 2015; MacLennan et al., 2006). These demographic variables were therefore tested as potential confounding variables in the analyses in this chapter. Also included as potential

confounding variables were the ability to manage on available income, selected as a more significant proxy for disposable income level, and reflecting CAM affordability. Racial ethnicity is a known factor in CAM use (Barnes, P. M. et al., 2009; Clarke et al., 2015) and whilst this demographic information is not specifically included in the ALSWH surveys, country of birth is recorded. In this sample, just over 93% of women were Australian born. Women who were born in Asia or countries other than Australia, Europe or other English-speaking country comprised just 0.36 % of the total ALSWH sample. This demographic was therefore not considered to constitute a significant confounding variable in these analyses.

Certain morbidities have been shown in previous cross-sectional studies to be associated with an increased use of CAM. A significant association between CAM use and diabetes (Egede, Ye, Zheng, & Silverstein, 2002; Norman et al., 2007; Saydah & Eberhardt, 2006; Yeh, Davis, & Phillips, 2006), hypertension (Barnes, P. M. et al., 2009; Egede et al., 2002; Yeh et al., 2006), anxiety (Barnes, P. M. et al., 2009; Hunt et al., 2010; Yeh et al., 2006), depression (Barnes, P. M. et al., 2009; Hunt et al., 2010; Yeh et al., 2006), asthma (Barnes, P. M. et al., 2009; D'Onise et al., 2013; Yeh et al., 2006) and cancer (Egede et al., 2002; Saydah & Eberhardt, 2006; Yeh et al., 2006) have all been reported in scientific observational studies, providing the rationale for their inclusion in the analysis. Iron deficiency/anaemia has a number of different aetiologies other than heavy or frequent periods and the standard conventional and complementary approach to build up iron levels is generally through oral dietary iron supplementation (Goddard, James, McIntyre, & Scott, 2011). Therefore, anaemia may result in higher CAM use that is unrelated to CPPD. The conditions regularly enquired into as part of the standard ALSWH survey are 'insulin-dependent (Type 1) diabetes', 'non-insulin-dependent (Type 2) diabetes', 'hypertension (high blood pressure)', 'anxiety disorder', 'depression', 'low iron (iron deficiency or anaemia', 'asthma' and 'other cancer' (other than skin cancer). As commonly encountered health issues, participants were asked to indicate if they had been diagnosed or treated for each of them in turn in the previous 3-year period. As co-morbidities to CPPD they were analysed to assess their potential contribution to be confounding factors in women's use of CAM associated with CPPD problems.

From the ALSWH survey, the questions relating to CPPD were identified as ‘premenstrual tension,' ‘irregular periods', ‘heavy periods,' ‘severe period pain' and ‘endometriosis.' Premenstrual tension (PMT) has been consistently used in ALSWH surveys and although the concept has been superseded by the term PMS the two names are used somewhat interchangeably in the literature and are considered synonyms (Whissell, 1996). Survey participants were asked to indicate if they had suffered any of these, apart from endometriosis, in the previous 12 months and if they had been diagnosed or treated for endometriosis in the previous three years. Endometriosis was included in this study because its symptoms are cyclical and would contribute to CPPD data.

Although women were asked to indicate if they had received a diagnosis of polycystic ovary syndrome (PCOS) in the ALSWH survey, it was excluded from this study as a distinct study group. The justification for doing so, as described in Section 2.2.1 relates to its lack of symptomatic association with the menstrual cycle, as well as the lack of a universally accepted symptom picture and criteria for diagnosis (Norman et al., 2007). It is also predominantly associated with endocrine or metabolic abnormalities (Norman et al., 2007). PCOS therefore does not fulfill the criteria for CPPD as described in Section 1.6.2, specifically that there is a related remission of symptoms post menstruation or obvious cyclical pattern to the symptoms.

Statistical analyses of the use of CAM practitioners, therapies and products amongst women with CPPD symptoms can assign probable associations between these two factors, they are not necessarily causally related. The very large, representative sample of Australian women on which the analyses are based does however strongly support the validity of the associations. The study also analysed the prevalence data in a broader context of international data and explored possible implications from the findings. Prevalence data are important for health providers across conventional and CAM domains as it is apparent from surveys across nations that women are using a variety of treatments, either alone or in combination, mainly through self-prescription.

The extent of CAM use, its efficacy and safety are of particular concern for all healthcare practitioners and providers in Australia as well as for women themselves and further contributes valuable information for worldwide consideration.

Women who had undergone bilateral oophorectomy or who were pregnant were excluded from analyses as they would not have been experiencing natural menstrual cycles for the previous 12 months of the survey enquiry.

4.3 The use of complementary and alternative medicine by 7,427 Australian women with cyclic perimenstrual pain and discomfort.

The findings of this study have been published as follows:

Fisher C, Adams J, Hickman L, Sibbritt D. (2016) The use of complementary and alternative medicine by 7427 Australian women with cyclic perimenstrual pain and discomfort: a cross-sectional study. *BMC Complementary and Alternative Medicine.* 2016; 16 (1):1-11.

A copy of this manuscript appears in Appendix 3.

4.3.1 Introduction

Menstruation is a normal, cyclic event spanning a women's life from the onset of puberty (usually around 12-13 years of age) through to menopause (which most women experience around 50 years of age). Although the phenomenon of cyclic problems experienced by women during their reproductive years had been recognised by Hippocrates modern science has not yet fully explained the causes of the variety of symptoms that can accompany the menstrual cycle (Bancroft, 1995; Nevatte, T. et al., 2013; Yonkers et al., 2008). Moreover, symptoms have been treated as separate

entities, most commonly identified as either premenstrual syndrome (PMS) or dysmenorrhoea, although their co-existence was highlighted by Bancroft in 1995 (Bancroft, 1995). Affective symptoms like irritability and depression and physical symptoms such as bloating, dysmenorrhoea, nausea and breast tenderness often occur in the luteal phase of the cycle and/or into menstruation. Symptoms may vary in severity and scope from one cycle to the next and are likely due to a number of different factors (Bancroft, 1995; Halbreich, U., 2003; Milewicz & Jedrzejuk, 2006; Sharp et al., 2002). Such changes were labelled 'cyclic perimenstrual pain and discomfort' (CPPD) by the Association of Women's Health, Obstetric and Neonatal Nurses (Sharp et al., 2002) to better reflect the protean nature of symptoms. It is estimated that between 80%-97% of women worldwide and across age groups experience at least one symptom during their reproductive life (Halbreich, U., 2003; Ju, Hong et al., 2014; Milewicz & Jedrzejuk, 2006; Wittchen et al., 2002). For up to 40% of women (Milewicz & Jedrzejuk, 2006) symptoms are moderate and for a further 2% - 10% of women symptoms are severe enough to interfere with normal daily life (Halbreich, U., 2003; Nevatte, T. et al., 2013; Sundell et al., 1990; Wittchen et al., 2002). It is possible that the prevalence of CPPD has increased as modern women are exposed to sex-hormone cycles for a greater proportion of their lives due to earlier onset of menarche, reduced number of births and the delayed resumption of menstrual cycles consequent on breastfeeding. Though cultural differences may change women's perception of, and treatment-seeking behaviour for, CPPD, its prevalence does not appear to be a cultural factor (Cheng, 2011a; Ju, H. et al., 2014; Lee, A. M. et al., 2009; Pan et al., 2014).

Complementary and alternative medicine (CAM) includes a range of diverse health-related strategies that can be described as predominantly operating outside the conventional medical curriculum and medical profession (WHO, 2000). The prevalence of CAM use worldwide is substantial (Harris, P. E. et al., 2012b; Thomson et al., 2014a), especially amongst women (Barnes, P. M. et al., 2009; Kristoffersen et al., 2014; Sibbritt, D. W., Adams, & Young, 2004; Steinsbekk et al., 2009; Xue et al., 2007). There is an acceptance of a multi-factorial aetiology for CPPD (Bancroft, 1995; Kaunitz et al., 2008; Nevatte, T. et al., 2013) and to-date conventional treatment protocols, which

focus on symptom-relief, ranging from counselling to pharmaceutical to surgical, have been employed. Neither single nor combinations of conventional therapies have produced consistent positive outcomes for CPPD (Sharp et al., 2002) and a large variety of both conventional and CAM approaches have been promoted by medical practitioners (Sharp et al., 2002; Weisz & Knaapen, 2009). Indeed there are clinical trials that support the use of CAM for aspects of CPPD such as *Vitex agnus-castus* (Schellenberg, 2001) or Chinese herbs (Jia, Wang, Xu, Zhao, & Zhang, 2006) for PMS and Transcutaneous Electrical Nerve Stimulation (TENS) (Lauretti, Oliveira, Parada, & Mattos, 2015) or acupuncture (Witt et al., 2008) for dysmenorrhoea. Previous work exploring CAM use for CPPD symptoms has revealed prevalence rates between 3% - 70% (Abdul-Razzak et al., 2010; Adegbesan-Omilabu et al., 2014b; Borah et al., 2013; Brito et al., 2012; Cheng, 2011a; Cheng & Lin, 2011; Chia, Lai, Cheung, Kwong, Lau, & Leung, 2013; Eladawi et al., 2014; Hamaideh et al., 2014; Lee, D. Y. et al., 2010; Missmer & Bove, 2011; Ohde et al., 2008; Pan et al., 2014; Seven et al., 2014; Sharma, A. et al., 2008; Tanaka et al., 2014; Tariq et al., 2009; Tolossa & Bekele, 2014) although prevalence of women's CAM use at any point for CPPD is likely to be very much higher (Corney & Stanton, 1991; Domoney et al., 2003a; Leather et al., 1993). Unfortunately, the extent of this behaviour is unknown, particularly in Western countries as few recent studies have been undertaken. In addition, there is a lack of good quality studies published in the peer-reviewed literature and surveys have varied widely in sample size and source, baseline and timeframe for measurement, questionnaire quality and method of data collection. All health practitioners need to be better-informed about this usage to enable more effective and safer symptom management.

Therefore, in an attempt to fill this gap in knowledge regarding CAM use for CPPD, this study presents a detailed analysis of the prevalence of CPPD symptoms in women from the large, nationally-representative Australian Longitudinal Study on Women's Health (ALSWH), examining the specific CAM adopted by women, over a twelve-month timeframe, according to their symptoms.

4.4 Method

4.4.1 Sample

Data was obtained from the (born in) 1973 - 78 cohort of the Australian Longitudinal Study on Women's Health (ALSWH). In 1996, the ALSWH participants were randomly selected from the national Medicare database, which is the universal healthcare provision for all Australians. The recruited sample comprised over 58,000 women from 3 aged groups (ie. 'young': 18 - 23 years; 'mid age': 45 - 50 years; 'older': 70 - 75 years), to examine women in the key stages of the lifespan. The recruited women have been surveyed, via postal questionnaires, at regular 3-yearly intervals. The ALSWH was designed to follow the cohorts over 20 years to monitor changes in health and are intended to help guide national health policy and provision. The analyses presented in this study were restricted to Survey 6 (conducted in 2012) of the young cohort (when they were aged 34 - 39 years), which included 8,009 respondents, a retention rate of eligible participants for this survey of 61.6%. In the first survey 14,247 women in this age group participated, census data for this demographic at the time of recruitment was 759,680. Ethical approval for the ALSWH was gained from the Human Ethics Committees at the University of Queensland and University of Newcastle. The study participants provided written consent.

4.4.2 Cyclic perimenstrual pain and discomfort symptoms

Women were asked if they had been diagnosed with endometriosis in the last 3 years. In addition, they were also asked how frequently they experienced premenstrual tension, irregular periods, heavy periods and severe period pain in the previous 12 months, with the response option being 'never', 'rarely', 'sometimes' or 'often'.

4.4.3 Complementary and alternative medicine use

Women's consultations with CAM practitioners were ascertained by questionnaire items asking them is they had consulted any of a list of practitioners, for their own

health, in the previous 12 months. The list of CAM practitioners included: chiropractor, osteopath, massage therapist, acupuncturist, naturopath/herbalist, and 'another alternative' health practitioner.

Women's use of CAM practices or products was ascertained by questionnaire items asking them how frequently they had used any of a list of therapies or products, for their own health, in the previous 12 months. The list of therapies or products included: vitamins/minerals, yoga/meditation, herbal medicines, aromatherapy oils, Chinese medicine and 'other alternative practices or products'. Possible response options were 'never', 'rarely', 'sometimes' and 'often'. Those responding 'never' or 'rarely' were categorised as non-users and the 'sometimes' and 'often' responders were classified as users for analysis purposes.

4.4.4 Confounders

Potential confounders identified (that were available in the questionnaire) were the demographic factors area of residence, educational status, ability to manage on income and marital status and the co-morbidities of insulin-dependent (Type 1) diabetes, non-insulin dependent (Type 2) diabetes, low iron (iron deficiency or anaemia), depression, anxiety disorder, asthma, 'other cancer' and hypertension.

Area of residence was categorised as either urban or rural. Educational status was grouped as one of three categories: no formal qualifications, year 10 or equivalent (e.g. school certificate), year 12 or equivalent (e.g. higher school certificate); trade /apprenticeship or certificate/diploma; and university degree. Ability to manage on available income was also grouped as one of three categories: it is impossible or it is difficult all of the time; it is difficult some of the time; and it is not too bad or it is easy. Marital status was grouped into three categories: never married; married/de facto; and separated or divorced or widowed.

4.4.5 Statistical Analysis

Bivariate analyses testing the association between CPPD symptom and CAM practitioner or CAM therapy use was conducted using chi-square tests. Logistic regression models were used to determine magnitude of association between CPPD symptom and CAM practitioner or therapy use, with adjustment for confounding variables. Statistical significance was set at the α=0.05 level for all analyses, using the statistical package STATA 14.0.

4.5 Results

There were 7,427 women who indicated they had not had a bilateral oophorectomy and were either not pregnant or unsure if they were pregnant. Amongst these women, the prevalence of CPPD-related problems was 3.7% for endometriosis, 41.2% had suffered from PMS sometimes or often, 22.2% had had irregular periods sometimes or often, 29.8% had experienced heavy periods sometimes or often and 24.1% had had severe period pain sometimes or often. Those women with endometriosis may account for around 4.9% of more frequent (ie. sometimes/often) PMS sufferers, 6.1% of more frequent cases of irregular periods, 6.1% of more frequent heavy periods and 8.3% of more frequent severe period pain sufferers.

The association between CAM practitioner consultations and CPPD symptoms are presented in Table 4.1. Women with endometriosis were significantly more likely to consult with a massage therapist, acupuncturist, and/or naturopath/herbalist compared to women who did not have endometriosis (all $p<0.05$). Consultations with a naturopath/herbalist were significantly higher for women suffering with irregular or heavy periods, compared to those without irregular and/or heavy periods (all $p<0.05$). Similarly, women with severe period pain were significantly more likely to consult with an acupuncturist and/or a naturopath/herbalist, compared to women without severe period pain (all $p<0.05$). Compared to women without PMS, women with PMS were

significantly more likely to consult with a massage therapist, acupuncturist, naturopath/herbalist and 'other alternative health practitioner' (all $p<0.05$).

Table 4.2 shows associations between use of CAM practices/products and CPPD symptoms. Women with PMS and/or painful periods were significantly more likely to use all CAM practices/products frequently, compared to women without PMS and/or painful periods (all $p<0.05$). With the exception of aromatherapy oils, endometriosis sufferers were significantly more likely to use all other CAM practices/products, compared to women without endometriosis (all $p<0.05$). Women who were suffering with irregular periods were more likely to use vitamins/minerals, herbal medicines, Chinese medicines, and/or 'other alternative practices and products', compared to women who did not suffer with irregular periods (all $p<0.05$). Women with menorrhagia were significantly more likely to use herbal medicines, aromatherapy oils and/or 'other alternative practices and products' compared to non-sufferers (all $p<0.05$).

Logistic regression modelling was used to determine the magnitude of associations between CPPD related problems and consultations with CAM practitioners, after adjusting for confounders (Table 4.3). Endometriosis sufferers were nearly 50% more likely to have consulted a massage therapist (OR= 1.48; 95% CI: 1.14, 1.92) and nearly twice as likely to have consulted with an acupuncturist (OR=1.79; 95% CI: 1.26, 2.56), compared to women without endometriosis. Women who 'sometimes' suffered PMS were more likely to have visited with a massage therapist (OR=1.29; 95% CI: 1.12, 1.48) but for 'often' sufferers this association was higher (OR=1.47, 95% CI: 1.23, 1.76), whilst 'sometimes' sufferers were also more likely to visit a naturopath/herbalists (OR=1.48, 95% CI: 1.19, 1.85) but were more than twice as likely to have done so when the PMS occurred 'often' (OR=2.12, 95% CI: 1.62, 2.76). Those women who indicated PMS occurred 'often' were over 60% more likely to have had osteopathic treatment (OR=1.64, 95% CI: 1.19, 2.20), and/or visited 'another alternative health practitioner' (OR=1.66, 95% CI: 1.20-2.29). Women who experienced heavy periods 'often' were 30% (OR=0.70, 95% CI: 0.56, 0.87) less likely to have used a massage therapist. No statistically significant associations were observed between any of the CAM

Table 4.1 The association between cyclic perimenstrual pain and discomfort (CPPD) and consultations with complementary and alternative medicine practitioners

Cyclic perimenstrual pain and discomfort symptoms	Chiropractor		Osteopath		Massage Therapist		Acupuncturist		Naturopath/Herbalist		Other CAM Practitioner	
	Yes (n=1,480)	No (n=5,929)	Yes (n= 621)	No (n= 6,781)	Yes (n= 3,152)	No (n= 4,260)	Yes (n= 667)	No (n= 6,733)	Yes (n= 835)	No (n= 6,567)	Yes (n= 568)	No (n= 6,833)
Endometriosis [C,D,E]	%	%	%	%	%	%	%	%	%	%	%	%
No	95	96	96	96	95	97	93	97	94	97	95	96
Yes	5	4	4	4	5	3	7	3	6	3	5	4
PMS [C, D, E, F]												
Never	36	38	33	38	34	40	31	38	29	39	29	38
Rarely	22	21	22	21	22	21	21	21	19	21	22	21
Sometimes	29	28	28	28	30	27	31	28	31	28	32	28
Often	13	13	17	13	14	12	17	13	21	12	17	13
Irregular Periods [E]												
Never	62	61	64	61	61	61	58	62	56	62	57	62
Rarely	14	17	16	16	16	17	17	16	17	16	16	16
Sometimes	15	13	12	14	14	13	14	13	16	13	16	13
Often	9	9	8	9	9	9	11	9	11	9	11	9
Heavy Periods [E]												
Never	51	53	54	52	52	53	52	53	46	53	49	53
Rarely	19	17	16	18	18	17	17	18	18	18	20	17
Sometimes	18	19	19	19	19	18	19	18	21	18	17	19
Often	12	11	11	11	11	12	12	11	15	11	14	11
Painful Periods [D,E]												
Never	53	53	52	53	51	54	48	54	48	54	48	53
Rarely	24	22	22	23	24	22	23	22	24	23	24	23
Sometimes	15	17	17	16	17	16	18	16	15	16	18	16
Often	8	8	9	8	8	8	11	8	13	7	10	8

[A] statistically significant association with chiropractor
[B] statistically significant association with osteopath
[C] statistically significant association with massage therapist
[D] statistically significant association with acupuncturist
[E] statistically significant association with naturopath/herbalist
[F] statistically significant association with 'other CAM' practitioner

Table 4.2. The association between cyclic perimenstrual pain and discomfort (CPPD) and use of complementary and alternative medicine practices and products

Cyclic perimenstrual pain and discomfort symptoms	Vitamins/Minerals		Yoga/Meditation		Herbal medicines		Aromatherapy oils		Chinese medicines		Other alternative therapies	
	Never or Rarely (n=2,377)	Sometimes or often (n=5,043)	Never or Rarely (n=5,705)	Sometimes or often (n=1,714)	Never or Rarely (n=5,917)	Sometimes or often (n=1,500)	Never or Rarely (n=6,212)	Sometimes or often (n=1,203)	Never or Rarely (n=7,016)	Sometimes or often (n=403)	Never or Rarely (n=6,659)	Sometimes or often (n=741)
	%	%	%	%	%	%	%	%	%	%	%	%
Endometriosis [A,B,C,E,F]												
No	98	96	97	94	97	95	96	96	97	92	97	94
Yes	2	4	3	6	3	5	4	4	3	8	3	6
PMS [A,B,C,D,E,F]												
Never	41	36	39	32	40	29	39	29	38	31	38	28
Rarely	22	20	21	20	21	20	21	20	21	20	22	18
Sometimes	26	30	28.	31	27	33	28	33	28	31	28	34
Often	11	14	12	17	12	18	12	18	13	18	12	20
Irregular Periods [A,C,E,F]												
Never	64	60	61	60	62	57	62	58	62	55	62	56
Rarely	16	17	17	16	16	17	16	18	16	16	16	16
Sometimes	12	14	13	15	13	16	13	14	13	17	13	16
Often	8	9	9	9	9	10	9	10	9	12	9	12
Heavy Periods [C,D,F]												
Never	55	51	53	51	54	47	54	47	53	49	54	45
Rarely	17	18	17	18	17	18	17	18	17	17	17	19
Sometimes	17	19	18	19	18	20	18	21	19	18	18	20
Often	11	12	12	12	11	15	11	14	11	16	11	16
Painful Periods [A,B,C,D,E,F]												
Never	55	52	54	50	55	45	55	45	53	46	54	43
Rarely	23	22	23	23	22	24	23	22	23	23	23	24
Sometimes	15	17	16	17	16	19	15	21	16	17	16	19
Often	7	9	7	10	7	12	7	12	8	14	7	14

[A] statistically significant association with vitamins/minerals
[B] statistically significant association with yoga or meditation
[C] statistically significant association with herbal medicines
[D] statistically significant association with aromatherapy oils
[E] statistically significant association Chinese medicines
[F] statistically significant association with 'other alternative therapies'

Table 4.3 The odds ratio for association of cyclic perimenstrual pain and discomfort and consultations with complementary and alternative medicine practitioners

Cyclic Perimenstrual Pain and Discomfort Symptom	Chiropractor (n=7005)	Osteopath (n=6997)	Massage Therapist (n=7008)	Acupuncturist (n=6999)	Naturopath/Herbalist (n=6999)	Other CAM Practitioner (n=6996)
	O/R (C.I.)	O/R (C.I.)	O/R (C.I.)	O/R (C.I.)	O/R (C.I.)	O/R (C.I.)
Endometriosis[C,D]						
No	1.00	1.00	1.00	1.00	1.00	1.00
Yes	1.30 (0.96-1.76)	1.11 (0.71-1.73)	1.48 (1.14-1.92)	1.79 (1.26-2.56)	1.32 (0.92-1.89)	1.21 (0.78-1.88)
PMS						
Never	1.00	1.00	1.00	1.00	1.00	1.00
Rarely	1.15 (0.97-1.37)	1.27 (0.99-1.62)	1.20 (1.05-1.38)	1.23 (0.96-1.58)	1.24 (0.99-1.57)	1.40 (1.08-1.83)
Sometimes[C,E]	1.12 (0.94-1.33)	1.26 (0.98-1.61)	1.29 (1.12-1.48)	1.32 (1.04-1.68)	1.48 (1.19-1.85)	1.45 (1.12-1.89)
Often[B,C,E,F]	1.06 (0.85-1.33)	1.64 (1.19-2.20)	1.47 (1.23-1.76)	1.47 (1.09-1.98)	2.12 (1.62-2.76)	1.66 (1.20-2.29)
Irregular Periods						
Never	1.00	1.00	1.00	1.00	1.00	1.00
Rarely	0.80 (0.67-0.97)	0.93 (0.72-1.20)	0.86 (0.74-0.99)	1.08 (0.84-1.38)	1.02 (0.82-1.28)	0.88 (0.67-1.16)
Sometimes	1.08 (0.90-1.30)	0.82 (0.61-1.09)	1.13 (0.97-1.32)	1.01 (0.77-1.32)	1.20 (0.95-1.51)	1.14 (0.87-1.50)
Often	0.91 (0.72-1.14)	0.89 (0.64-1.24)	1.00 (0.83-1.20)	1.15 (0.85-1.56)	1.15 (0.88-1.52)	1.07 (0.77-1.48)
Heavy Periods						
Never	1.00	1.00	1.00	1.00	1.00	1.00
Rarely	1.21 (1.00-1.46)	0.78 (0.59-1.03)	0.96 (0.83-1.12)	0.81 (0.62-1.06)	1.06 (0.83-1.35)	1.03 (0.78-1.36)
Sometimes	0.99 (0.81-1.22)	0.78 (0.58-1.03)	0.84 (0.71-0.99)	0.77 (0.58-1.01)	1.11 (0.86-1.42)	0.77 (0.57-1.05)
Often[C]	1.13 (0.87-1.47)	0.58 (0.40-0.86)	0.70 (0.56-0.87)	0.60 (0.42-.087)	0.97 (0.70-1.34)	0.89 (0.60-1.30)
Painful Periods						
Never	1.00	1.00	1.00	1.00	1.00	1.00
Rarely	0.96 (0.81-1.15)	1.11 (0.86-1.43)	1.16 (1.01-1.34)	1.15 (0.90-1.47)	0.94 (0.75-1.18)	1.04 (0.80-1.36)
Sometimes	0 .86 (0.69-1.06)	1.25 (0.92-1.69)	1.06 (0.89-1.27)	1.20 (0.89-1.60)	0.69 (0.52-0.90)	1.05 (0.77-1.44)
Often	0 .96 (0.71-1.29)	1.48 (0.98-2.23)	1.14 (0.89-1.46)	1.70 (1.16-2.51)	1.11 (0.78-1.57)	1.09 (0.71-1.68)

[A] statistically significant association with chiropractor
[B] statistically significant association with osteopath
[C] statistically significant association with massage therapist
[D] statistically significant association with acupuncturist
[E] statistically significant association with naturopath/herbalist
[F] statistically significant association with 'other CAM' practitioner

Adjusted for confounding variables - marital status, area of residence, educational status, low iron, depression and anxiety disorder.

Table 4.4 The odds ratio for association between cyclic perimenstrual pain and discomfort and use of complementary and alternative medicine practices and products

Cyclic Perimenstrual Pain and Discomfort Symptom	Vitamins/minerals (n=7017)	Yoga/meditation (n=7014)	Herbal medicines (n=7013)	Aromatherapy (n=7012)	Chinese medicines (n=7015)	Other alternative therapies (n=6996)
	O/R (C.I.)	**O/R (C.I.)**	**O/R (C.I.)**	**O/R (C.I.)**	**O/R (C.I.)**	**O/R (C.I.)**
Endometriosis[A,B,E]						
No	1.00	1.00	1.00	1.00	1.00	1.00
Yes	1.72 (1.24-2.38)	1.80 (1.37-2.38)	1.34 (1.00-1.79)	0.86 (0.61-1.22)	1.86 (1.22-2.83)	1.28 (0.88-1.85)
PMS						
Never	1.00	1.00	1.00	1.00	1.00	1.00
Rarely[C]	1.08 (0.93-1.25)	1.20 (1.01-1.41)	1.31 (1.09-1.56)	1.27 (1.04-1.54)	1.15 (0.84-1.57)	1.14 (0.89-1.46)
Sometimes[A,B,C,D,F]	1.31 (1.13-1.52)	1.34 (1.14-1.59)	1.49 (1.25-1.77)	1.49 (1.23-1.80)	1.24 (0.91-1.68)	1.46 (1.16-1.84)
Often[A,B,C,D,F]	1.47 (1.21-1.80)	1.64 (1.33-2.02)	1.72 (1.39-2.14)	1.53 (1.21-1.94)	1.38 (0.95-2.01)	1.69 (1.27-2.23)
Irregular Periods						
Never	1.00	1.00	1.00	1.00	1.00	1.00
Rarely	1.16 (0.99-1.36)	0.94 (0.79-1.12)	0.97 (0.81-1.16)	1.02 (0.84-1.23)	1.06 (0.77-1.46)	0.89 (0.70-1.13)
Sometimes	1.21 (1.02-1.44)	1.10 (0.92-1.32)	1.15 (0.96-1.38)	0.96 (0.78-1.18)	1.43 (1.04-1.96)	1.11 (0.87-1.41)
Often	1.13 (0.93-1.38)	0.96 (0.77-1.20)	1.00 (0.80-1.24)	0.91 (0.72-1.17)	1.34 (0.93-1.94)	1.09 (0.82-1.45)
Heavy Periods						
Never	1.00	1.00	1.00	1.00	1.00	1.00
Rarely	1.04 (0.89-1.23)	0.97 (0.81-1.16)	0.92 (0.76-1.12)	0.92 (0.75-1.14)	0.83 (0.59-1.16)	1.04 (0.81-1.35)
Sometimes	0.97 (0.82-1.16)	0.90 (0.74-1.09)	0.93 (0.76-1.13)	0.94 (0.76-1.16)	0.65 (0.46-0.94)	0.89 (0.69-1.16)
Often[B]	0.78 (0.62-0.98)	0.68 (0.53-0.88)	0.92 (0.72-1.19)	0.82 (0.62-1.08)	0.72 (0.46-1.11)	0.85 (0.61-1.19)
Painful Periods						
Never	1.00	1.00	1.00	1.00	1.00	1.00
Rarely	0.85 (0.73-0.98)	1.01 (0.86-1.20)	1.10 (0.92-1.31)	1.04 (0.86-1.27)	1.18 (0.87-1.62)	1.16 (0.91-1.47)
Sometimes[D]	0.94 (0.78-1.13)	1.04 (0.85-1.28)	1.17 (0.95-1.44)	1.46 (1.17-1.82)	1.21 (0.83-1.76)	1.21 (0.92-1.60)
Often[C,D,F]	1.15 (0.88-1.50)	1.31 (0.99-1.73)	1.63 (1.24-2.15)	1.76 (1.30-2.38)	1.79 (1.11-2.87)	1.73 (1.21-2.47)

[A] statistically significant association with vitamins/minerals
[B] statistically significant association with yoga or meditation
[C] statistically significant association with herbal medicines
[D] statistically significant association with aromatherapy oils
[E] statistically significant association Chinese medicines
[F] statistically significant association with 'other alternative therapies'

Adjusted for confounding variables - marital status, area of residence, educational status, low iron, depression and anxiety disorder.

practitioner groups and irregular periods or painful periods.

Table 4.4 shows the results of logistic regression modelling used to determine the magnitude of associations between CPPD related problems and use of CAM practices/products, after adjusting for confounders. Women with endometriosis were more likely to have used vitamins/minerals (OR=1.72; 95% CI: 1.24, 2.38), yoga/meditation (OR=1.80; 95% CI: 1.37, 2.38) and/or Chinese medicines (OR=1.86; 95% CI: 1.22, 2.83), compared to women without endometriosis. PMS sufferers showed around a 30% (OR=1.31; 95% CI: 1.09, 1.56) increased likelihood to have used herbal medicine if their symptoms were 'rare' but this likelihood increased for 'sometimes' sufferers (OR=1.49; 95% CI: 1.25, 1.77) and was greatest for 'often' sufferers (OR=1.72; 95% CI: 1.39, 2.14). Those who suffered PMS 'sometimes' or 'often' were also more likely to use vitamins/minerals (OR=1.31; 95% CI: 1.13, 1.52 and OR=1.47; 95% CI: 1.21, 1.80 respectively), yoga/meditation (OR=1.34; 95% CI: 1.14, 1.59 and OR=1.64; 95% CI: 1.33, 2.02 respectively), aromatherapy oils (OR=1.49; 95% CI: 1.23, 1.80 and OR=1.53; 95% CI: 1.21, 1.94 respectively) and/or 'other alternative therapies' (OR=1.46; 95% CI: 1.16, 1.84 and OR=1.69; 95% CI: 1.27, 2.23 respectively). Women who experienced heavy periods 'often' were less likely to use yoga/meditation (OR=0.68; 95% CI: 0.53, 0.88), compared to women who 'never' experienced heavy periods. Women who 'sometimes' had severe period pain were more likely to have used aromatherapy oils (OR=1.46; 95% CI: 1.17, 1.82) but if the dysmenorrhoea was 'often' this likely use increased to over 70% (OR=1.76; 95% CI: 1.30, 2.38). This group of 'often 'dysmenorrhoea sufferers were also more likely to have used herbal medicines (OR= 1.63; 95% CI: 1.24, 2.15) and/or 'other alternative therapies' (OR=1.73; 95% CI: 1.21, 2.47), compared to women who 'never' experienced dysmenorrhoea. There were no significant associations between the irregular period categories and use of any CAM therapies or products.

4.6 Discussion

Results from this analysis of 34 - 39-year-old menstruating women derived from a large

nationally representative sample of Australian women contributes important information regarding the prevalence of CPPD symptoms and their relationship to the differential adoption of CAM. The analysis further indicates that women experiencing CPPD symptoms are likely to be using CAM of which the majority involves CAM products and therapies rather than consultations with CAM practitioners.

4.6.1 Prevalence of CPPD

The prevalence for endometriosis in this cohort was 3.7%, which is supported by the Global Burden of Disease Study 2013 which estimated the prevalence of CPPD at 4.8% for the years 2006-13 (Vos et al., 2015).

The prevalence for PMS of 43.3% in our study compares favourably with that from international data of 47.8% from a meta-analysis based on 17 international studies from 1996 - 2011 (Direkvand-Moghadam et al., 2014). Irregular periods were experienced by 22.3% of women in our cohort. A broad range of prevalence estimates of irregular periods 6.5% - 83.3% was reported from a systematic review of data from developing countries (Harlow & Campbell, 2004) and 25.6% of 18 - 40 year-old nulliparous Danish women self-reported irregular periods (Hahn et al., 2013). Our cohort had a menorrhagia prevalence of 29.9% which tallies well with self-reported assessments elsewhere; a review of the literature up to 2005 found six reports of prevalence of heavy periods of between 10% - 30% with lower levels objectively determined while higher levels were based upon subjective assessments(Liu et al., 2007). The prevalence of severe period pain determined from our data, at 24.2%, falls within the range derived from a 2002-2011 review across 15 studies of 2% - 29% severe period pain (Ju, Hong et al., 2014). Comparative data for the same age group is limited, but includes Korean (Lee, D. Y. et al., 2010), Japanese (Ohde et al., 2008) and UK (Santer, Warner, & Wyke, 2005) surveys where the prevalence was 68%, 29.2% and 15% respectively however only the latter two were based on severe levels of dysmenorrhoea.

4.6.2 CAM use for CPPD

After adjusting for potential confounders, women with endometriosis in our sample were much more likely to visit with a massage therapist and/or acupuncturist and to use vitamins/minerals, yoga/meditation and/or Chinese medicines. Massage and acupuncture has previously been reported by endometriosis sufferers as satisfactory treatment for its associated leg pain (Missmer & Bove, 2011) and there is evidence that Chinese medicines and acupuncture can reduce both endometriosis signs and symptoms (Kong et al., 2014). Whilst no other direct research has been carried out into CAM for endometriosis there are studies indicating vitamins/minerals for reducing dysmenorrhoea which is a significant factor in symptomatic endometriosis (Fugh-Berman & Kronenberg, 2003).

Our analyses indicate that frequent PMS sufferers are more likely than those women who never or rarely experience this symptom to visit with a massage therapist or naturopath/herbalist, as well as increasing the likelihood of visiting an osteopath. All CAM practices and products included in this study were used with a significantly greater likelihood by women with PMS than those who either did not, or rarely experienced PMS, except for Chinese medicines and that there was an increasing trend to use herbal medicine with increasing frequency of PMS. PMS is the most common CPPD symptom in our cohort and lack of specific, effective medications may account for the higher observed likelihood of use of multiple CAM practitioners and therapies. As reported in previous studies, more than half of PMS sufferers who used vitamins/dietary supplements (Campbell, E. M., Peterkin, O'Grady, et al., 1997; Domoney et al., 2003a; Pullon, S.R. et al., 1989) , acupuncture (Domoney et al., 2003a; Kuppermann et al., 2007), homeopathy (Domoney et al., 2003a; Singh et al., 1998), yoga/mind body (Pullon, S.R. et al., 1989; Singh et al., 1998) and massage (Campbell, E. M., Peterkin, O'Grady, et al., 1997; Pullon, S.R. et al., 1989) have reported finding them satisfactory as a treatment. The association between CAM practitioner visits in our study provides some of the only data available with regard to PMS sufferers. A review of evidence for CAM and PMS highlighted at least a 50% improvement in symptoms

from studies of women using either acupuncture or herbal medicine (both Western and Chinese) (Jang, Kim, & Choi, 2014). This is in contrast to our data which found no association between more frequent levels of PMS and visits to an acupuncturist or use of Chinese medicines and this may reflect the cultural differences in behaviour of Australian women with less exposure and knowledge of traditional Chinese medicine than women in cultures where it is more main stream. Systematic reviews of PMS treatment have indicated CAM that may be useful includes massage therapy, reflexology, calcium, vitamin B_6 (Girman, Lee, & Kligler, 2003; Jarvis, C. I., Lynch, & Morin, 2008) and possibly magnesium and yoga (Girman et al., 2003). Our data indicates that women with PMS are indeed adopting these CAM.

Irregular and heavy periods and CAM use has not been well investigated, although there are qualitative studies showing that either type of irregular bleeding has been given as a reason for seeking out CAM (Chapple, 1999; Kuppermann et al., 2007; Sharma, A. et al., 2008). However, analysis of specific CAM use is scant, with use of these modalities being based on tradition or anecdotal evidence. Those women in our study were no more likely to use any CAM practitioner or CAM practice/product compared to non-sufferers. However, women with heavy periods demonstrated a decreased likelihood of visiting a massage therapist or using yoga/meditation. Menorrhagia is likely to limit women's daily activities due to discomfort and embarrassment and therefore these results are not unexpected (Karlsson, Marions, & Edlund, 2014).

Women with severe period pain in this cohort used limited CAM, being more likely to have used aromatherapy oils when dysmenorrhoea occurred with any sort of frequency and herbal medicines if the pain occurred often. There are a number of surveys into women's choice of treatment for dysmenorrhoea and they have reported that over 50% of women surveyed were satisfied with herbal medicine (Cheng & Lin, 2011; Chia, Lai, Cheung, Kwong, Lau, & Leung, 2013; Kuppermann et al., 2007), vitamin/dietary supplements (Chia, Lai, Cheung, Kwong, Lau, & Leung, 2013; Kuppermann et al., 2007) and acupuncture for 'pelvic discomfort' (Kuppermann et al., 2007) however the latter two CAM were not significantly adopted by our cohort. A few

recent clinical trials indicated aromatherapy may reduce dysmenorrhoea (Ou, Hsu, Lai, Lin, & Lin, 2012; Yoo-Jin Kima, Leeb, Yang, & Hur, 2011) and traditional herbal medicines have established uterine spasmolytic properties and have also been effective in trials in reducing dysmenorrhoea (Heidarifar et al., 2014; Van Andel, Boera, Barnes, & Vandebroek, 2014) lending support to the practice highlighted in our analysis.

For many women, both the regular occurrence of CPPD symptoms and lack of effective treatments offered, may explain sufferers' frequent adoption of some CAM. That CAM practitioner visits are much less prevalent than CAM practice/product use leads to the conclusion that self-prescription in this sector is common and raises important issues of efficacy and safety in the absence of professional supervision. In addition, whilst CPPD categories have been largely compartmentalised in the literature, data from this survey indicates a great deal of crossover of CPPD symptoms within this age group. The overall prevalence of CPPD is 56.8% in this cohort emphasising the significance of CPPD as a health issue amongst women aged 34 - 39 years and indeed this level is likely to be understated as only severe levels of dysmenorrhoea were recorded.

The limitations of our study are first the retrospective recording of both CAM use and CPPD symptoms which are therefore subject to recall bias. Second, due to the self-perceived nature of the CPPD symptoms examined and the lack of a clear definition to categorise them, subjective reporting makes data comparisons more difficult. The large sample size and otherwise representative nature of this cohort of 34 - 39 year-old women, as well as the specific enquiry into those CAM commonly used in Australia does however provide valuable insights, especially for health providers, into the extent and preferential use of CAM for specific CPPD symptoms.

4.7 Conclusion

This analysis has confirmed the high levels of CPPD symptoms and CAM use amongst women in this age group and provides the first detailed insight into the differential adoption of different individual CAM practitioners and practices/products across CPPD symptoms. Whilst women with PMS and severe dysmenorrhoea are using CAM, those with heavy and irregular bleeding may be unaware of existing CAM options. However, more extensive investigation is required to ascertain how effective and safe CAM use is in these circumstances, what is motivating their usage and how well informed all relevant health practitioners, as well as women with CPPD, are regarding the use of appropriate CAM.

4.8 Chapter summary

This chapter has provided the rationale, methodology, results and analysis of data on CAM use by women with CPPD. This is the first analyses of data on the prevalence of CPPD issues for Australian women and the associated use of CAM in almost 20 years. The prevalence of main CPPD symptoms in the young cohort of women was presented and discussed with regard to similar, available international data. Through statistical analyses of the survey data, it has been possible to not only highlight the associated use of particular CAM practitioners, products and therapies for specified CPPD symptoms but to quantify that association to provide a meaningful context in which to appreciate how different CAM use may be related to women with these conditions. The information presented provides an initial assessment of particular CAM used for specific CPPD symptoms that may be used to direct future research into the types of CAM that could benefit the treatment of this prevalent health issue.

The following chapter will examine the changes in prevalence of CPPD and the association between symptoms and CAM use within this same cohort of Australian women monitored over three different time frames.

5. A longitudinal analysis of changes in cyclic perimenstrual pain and discomfort amongst Australian women and their associated complementary and alternative medicine use.

5.1 Chapter introduction

This chapter extends the study into women and their prevalence of CPPD and associated CAM use by adding the dimension of aging; by incorporating time-related changes to both symptoms, CAM use and the association over time between the two. Changes measured over time based on individuals in a single cohort and using very similar methodology in data collection are afforded by longitudinal surveys such as the ALSWH; providing invaluable insights into how age may have changed behaviour around CPPD.

Over three consecutive surveys, conducted in 2006, 2009 and 2012, the prevalence of CPPD in a sample of Australian women and their changing patterns of CAM use was tracked as they aged. Through the use of statistical analyses, the likely associations of CAM usage with CPPD symptoms can be probabilistically established. The study provides valuable data reflecting how the prevalence of menstrual symptoms was affected by aging over a seven-year period as well as the change in use of CAM practitioners, therapies and products that may be associated with these changes, highlighting *potential* causal relationships.

5.2 Background

The study is based on the young cohort of the ALSWH who were aged 18 - 23 years old at the inception of this study in 1996. Data collected from three different points in time from Surveys 4, 5 and 6 conducted in 2006, 2009 and 2012 respectively, provided information for the women as their age range changed from 28 - 33 years in 2006 to the 34 - 39 years in 2012. It was not possible to use a longer timeline, even though the ALSWH surveys go back to 1996, due to item changes introduced into the survey instrument. In particular, early questionnaires did not identify separately the major

Table 5.1 Comparison of information for ALSWH surveys

	Survey 1	Survey 2	Survey 3	Survey 4	Survey 5	Survey 6
CPPD	Yes Except endometriosis	Yes No 'never' option	Yes	Yes	Yes	Yes
CAM						
Practitioners	Single Question	Single Question	Single Question	Yes	Yes	Yes
Products/Therapies	No	No	No	Yes	Yes	Yes
Confounders						
Co-morbidities						
Time frame	Ever	last 4 yrs or	Last 3 yrs	Last 3 years	Last 3 years	Last 3 years
Diabetes	Yes	before Yes	Yes	Yes	Yes	Yes
Hypertension	Yes	Yes	Yes	Yes	Yes	Yes
Low iron	Yes	Yes	Yes	Yes	Yes	Yes
Asthma	Yes	Yes	Yes	Yes	Yes	Yes
Depression	No	Yes	Yes	Yes	Yes	Yes
Anxiety	No	Yes	Yes	Yes	Yes	Yes
Cancer	specify elsewhere	specify elsewhere	specify elsewhere	specify elsewhere	Yes-Skin or other	Yes-Skin or other
Demographics						
Area	Yes	Yes	Yes	Yes	Yes	Yes
Education	Yes	Yes	Yes	Yes	Yes	Yes
Income	Yes	No	Yes	Yes	Yes	Yes
Marital status	Yes	Yes (no de-facto option)	Yes	Yes	Yes	Yes
Bilateral oophorectomy	Not asked	Not asked	Not asked	Not asked	Yes	Yes
Pregnant	Yes	Yes	Yes	Yes	Yes	Yes

groups of CAMs. Table 5.1 indicates the significant changes to the questionnaire that provided the rationale for choosing the specified time points. Whilst the surveys have examined the prevalence of CPPD and CAM usage for each woman who participated in all of the selected surveys, the women's reasons for choosing to use a particular CAM has not been established. Therefore, a direct causal relationship cannot be categorically stated based on these data, neither is it possible to attribute any change in status of CPPD to CAM use. However, the statistical analyses do allow for a probabilistic association of the two factors over the seven-year time frame of the surveys.

Changes in CPPD with age adds important new data to the field of women's health as there are relatively few studies published which have followed changes in any related CPPD symptoms within the same cohort over a time frame greater than one year. Studies that have done so include tracked changes in dysmenorrhoea over six years where prevalence decreased with aging (Weissman et al., 2004); PMS over 10 years where prevalence increased with aging (Merikangas, Foeldenyi, & Angst, 1993); PMDD over 4 years over which time prevalence was stable (Wittchen et al., 2002); and a study that tracked changes in both dysmenorrhoea and PMS over a 13 year period where the prevalence of dysmenorrhoea decreased from age 22 years to 36 years before rising and PMS increased after age 33 years. In this latter study, however, the individual women's patterns of change were very variable for both these CPPD issues (Ju, H. et al., 2014). An international study of PMS-associated symptoms within women of different age groups suggested that these symptoms may have their own clinical patterns of progression. Some symptoms persist through the reproductive years whilst others remit with age, and yet others increase until around 35 years of age, before decreasing (Dennerstein, Lehert, & Heinemann, 2011).

Changes in use of CAM itself over the seven-year period may have been influenced to some degree by changes in social attitudes to, and availability of, different CAM, an area that requires more detailed investigation. From the point of view of this cohort though the questions relating specifically to CAM practitioners, products and therapies enquired into were constant across the surveys. The ability of rural women to access

the same range of CAM as their urban counterparts has been accounted for in the statistical analysis.

In addition to the demographic factors incorporated into the statistical analyses in Chapter 4 and detailed in section 4.2 Background, other factors were introduced as potential confounders. Factors included Body Mass Index (BMI), a high BMI has been established as a factor in menstrual cycle irregularities and heavy periods (Hahn et al., 2013) whilst a low BMI may be a contributing factor in dysmenorrhoea (Osayande & Mehulic, 2014); exercise levels, low levels have been associated with irregular cycles (Hahn et al., 2013) whilst regular exercise may reduce dysmenorrhoea (Osayande & Mehulic, 2014); parity, women who have not gone through childbirth may tend to have higher levels of dysmenorrhoea (Weissman et al., 2004); and stress has been shown to increase dysmenorrhoea (Ju, Hong et al., 2014; László, Gyorffy, Ádám, Csoboth, & Kopp, 2008; Wang et al., 2004) and cycle irregularities (Nagma et al., 2015). Although potential factors are by no means all fully identified or substantiated as true confounding variables and further research to clarify their importance is required (Iacovides et al., 2015). For instance, Dawood dismisses parity as a contributing factor to dysmenorrhoea and questions the impact of exercise level on its prevalence (Dawood, 2006). Ethnicity may influence the prevalence of CPPD (Takeda, Tasaka, Sakata, & Murata, 2006; Taylor, 2005) and is a factor in CAM use (Barnes, P. M. et al., 2009; Clarke et al., 2015) but this demographic information is not directly sought in the ALSWH surveys. Rather the country of birth has been recorded and women who were born in Asia or countries other than Australia, Europe or other English-speaking country made up just 0.36% of the total 2012 ALSWH sample. Never-the-less for completeness this demographic measure was treated as a potential confounding variable in these analyses.

Also factored into the analyses were women's use of oral contraceptive or hormonal pills which can reduce PMS, dysmenorrhoea and heavy periods (Ju, Hong et al., 2014; Marret et al., 2010; Santer et al., 2005). Similar considerations apply to hormone implant devices which can, in addition, contribute to increased heavy periods (Santer et al., 2005).

Pregnant women and those with bilateral oophorectomy were excluded from analyses as they would not have had normal menstrual cycles in the 12 months prior to survey. Those women who had had cancer were also excluded as the disease and/or its treatment may have influenced CPPD symptoms and CAM use. Cancer has been identified as contributing factor in the increased use of CAM (Egede et al., 2002; Yeh et al., 2006) and medications used in reproductive cancers often affect sex hormone levels and therefore the menstrual cycle (Wenners et al., 2017). Women who had been diagnosed with cancer, other than skin cancer, represented a minority of the women in this ALSWH sample. Those women within the eligible sample who had been diagnosed or treated for cancer in the previous three years varied from 0.86% to 1.29% of the total over the three surveys.

5.3 Cyclic perimenstrual pain and discomfort and Australian women's associated use of complementary and alternative medicine: a longitudinal study.

The findings of this study have been published as follows:

Fisher C, Hickman L, Adams J, Sibbritt D. (2018) Cyclic Perimenstrual Pain and Discomfort and Australian Women's Associated Use of Complementary and Alternative Medicine: A Longitudinal Study. *Journal of Women's Health,* 27(1):40-50.

A copy of this manuscript appears in Appendix 4.

5.3.1 Introduction

In 2002 the Association of Women's Health, Obstetric and Neonatal Nurses organized the diverse symptoms associated with perimenstrual symptoms into the concept of cyclic perimenstrual pain and discomfort (CPPD)(Sharp et al., 2002). This term

encompasses a cluster of symptoms commonly experienced by many women which were treated as single menstrual issues, predominantly premenstrual syndrome (PMS) and dysmenorrhoea (Sharp et al., 2002). It is now well established that between 80-97% of women experience at least one CPPD symptom between ages 12 - 50 years (Milewicz & Jedrzejuk, 2006; Wittchen et al., 2002). For some 40% of women the symptoms are moderate (Milewicz & Jedrzejuk, 2006), for up to 10% they are severe enough to interfere with normal educational, professional and/or social functions according to their menstrual cycles (Wittchen et al., 2002). These life-changing disadvantages have serious ramifications for a minority of women (Halbreich, U., 2003; Nevatte, T. et al., 2013; Sundell et al., 1990; Wittchen et al., 2002). Symptoms of CPPD, estimated to number over 300, may be 'affective' (emotional/mental such as irritability, anxiety and depression), physical (commonly breast tenderness, bloating, headache and cramping) or a combination (Kaunitz et al., 2008; Sharp et al., 2002). Symptom patterns may vary in nature, frequency, severity and/or over time for each woman. Whilst disturbances in sex hormones and their effect on neurotransmission are implicated, no single aetiology satisfactorily explains all CPPD manifestations (Bancroft, 1995; Halbreich, U., 2003; Milewicz & Jedrzejuk, 2006).

Complementary and alternative medicine (CAM) is broadly defined by the World Health Organization as those therapies not routinely taught or used in conventional medical settings (WHO, 2004). CAM use has increased world-wide (Harris, P. E. et al., 2012b; Thomson et al., 2014b) with women identified as predominant users (Kristoffersen et al., 2014; Sibbritt, D. W. et al., 2004; Steinsbekk et al., 2009). Conventional medical treatment for CPPD is wide-ranging and symptom-related, encompassing pharmaceutical, surgical and psychological treatments, none of which are wholly effective alone or in combination (Kaunitz et al., 2008; Sharp et al., 2002), benefitting up to 60% of sufferers (Freeman, 2010). Indeed, studies consistently indicate that most women with CPPD seek no medical help (Chia, Lai, Cheung, Kwong, Lau, & Leung, 2013; Hylan et al., 1999; Pitts et al., 2008). At the same time, various CAM clinical trials have reported benefits in CPPD treatment including herbal medicine for PMS (Chou, Morse, & Xu, 2008; Schellenberg, 2001) and acupuncture (Witt et al., 2008) and herbs for dysmenorrhoea (Sadeghi Aval Shahr, Saadat, Kheirkhah, & Saadat,

2015). Data from 20 cross-sectional studies conducted since 2007 indicate prevalence of CAM use for CPPD of between 7% - 70% (mean=30%). (Abdul-Razzak et al., 2010; Adegbesan-Omilabu et al., 2014b; Borah et al., 2013; Brito et al., 2012; Cheng & Lin, 2011; Chia, Lai, Cheung, Kwong, Lau, & Leung, 2013; Eladawi et al., 2014; Gold et al., 2007; Hamaideh et al., 2014; Kuppermann et al., 2007; Lee, A. M. et al., 2009; Missmer & Bove, 2011; Ohde et al., 2008; Pan et al., 2014; Seven et al., 2014; Sharma, A. et al., 2008; Tanaka et al., 2014; Tariq et al., 2009; Tolossa & Bekele, 2014). Whilst these studies represent a significant increase in research into CAM use for CPPD, the data lack coherence due to enormous variations in design and methodology. Additionally, few studies have tracked changes in CPPD symptoms with aging and to-date none have examined CAM use over time amongst women experiencing CPPD. This present study initiates the process of analysing age-related changes in CPPD and associated changes in CAM use, an important but under-studied area of research.

5.3.2 Materials and Methods

5.3.2.1 Sample

The Australian Longitudinal Study on Women's Health (ALSWH), initiated in 1996, aimed to assess and monitor women's health, including their health-seeking behaviour using surveys conducted at 3-yearly intervals. Over 58,000 women in three age groups ('young', 18 - 23 years; 'mid-age', 45 - 50 years; 'older', 70 - 75 years) were randomly selected from the national Medicare database and invited by mail to participate. The current analysis was based on the 'young' cohort of women, born between 1973 and 1978, as they represented women in the middle of the menstruating period of their lives. The baseline response rate for this cohort of 41% - 42% was estimated, due to uncertainty over the original Medicare database's accuracy (Lee, C. et al., 2005), however the demographic profile indicated responders were a representative sample when compared to 1996 census data (Brown, W. J. et al., 1999b). Data from surveys 4, 5 and 6, conducted in 2006, 2009 and 2012 respectively**,** obtained via questionnaires, were analysed. The response rates over the three surveys were 68% (n=9145) for survey 4 and 62% (n=8200) for surveys 5 and 6 (n=8010).

Ethical approval for the ALWSH was granted by the Human Ethics Committee at the University of Queensland and University of Newcastle and written consent was obtained from all participants.

5.3.2.2 Cyclic Perimenstrual Pain and Discomfort (CPPD) symptoms

Questions to participants included being diagnosed with endometriosis in the previous 3 years and the frequency of experiencing the following undefined conditions**,** premenstrual tension, irregular periods, heavy periods and severe period pain for 12 months prior to each survey, using the grades 'never', 'rarely', 'sometimes' or 'often'. The term 'premenstrual tension' has been used consistently in these surveys, its original reference relating to emotional changes that occurred prior to menstruation. 'Premenstrual syndrome', suggested in 1953 to take into account the physical and behavioural changes that also occur at this time, is the current terminology (Ussher, 2014).

5.3.2.3 Complementary and alternative medicine (CAM) use

In each survey, for the previous 12-month period, women were asked to respond to the question of whether they had consulted with a chiropractor, osteopath, massage therapist, acupuncturist and/or naturopath/herbalist for their own health. Participants were also questioned about CAM therapy and products used for their own health in the previous 12 months. Specific categories listed were 'vitamins/minerals', 'yoga/meditation', 'herbal medicines', 'aromatherapy oils' and 'Chinese medicine'; with answers graded by frequency of use as 'never', 'rarely', 'sometimes' or 'often'.

5.3.2.4 Confounders

The demographic factors 'area of residence', 'educational status', 'ability to manage on income' , 'marital status', 'body mass index' (BMI) calculated from height and weight, without shoes, ,' parity' based on live births, 'stress', 'exercise level ' , 'contraceptive

use' (oral and/or implant) and 'ethnicity' as well as the co-morbidities 'insulin-dependent (Type 1) diabetes ', 'non-insulin dependent (Type 2) diabetes', 'low iron (iron deficiency or anaemia)', 'depression', 'anxiety disorder', 'asthma' and 'hypertension (high blood pressure)' were ascertained from the survey and identified as potential confounders. All co-morbidities were coded in the affirmative if diagnosed or treated in the previous 3-year period. Women who had been diagnosed with cancer in the previous three years, totalling 261 over the three surveys, were excluded from all analyses as the disease and/or its treatment may have affected symptom reporting and CAM use.

Area of residence was categorised as either urban or rural. Educational status was categorised as: (1) 'No formal qualifications'/'Year 10 or equivalent (e.g. School Certificate)'/ 'Year 12 or equivalent (e.g. Higher School Certificate)'; (2) 'Trade / apprenticeship'/ 'Certificate/diploma'; and (3) 'University/Higher university degree'. Ability to manage on available income was categorised as: (1) 'It is impossible'/'It is difficult all of the time'; (2) 'It is difficult some of the time'; and (3) 'It is not too bad'/'It is easy'. Marital status was categorised as: (1) 'Never married'; (2) 'Married/De facto (opposite and same sex)'; and (3) 'Separated/Divorced/Widowed'. BMI was categorised as: 1)'<18.5kg/m^2'(underweight); (2) '18.5-<25.0kg/m^2' (normal); (3) '=>25-<30 kg/m^2'(overweight); (4) '=>30 kg/m^2'(obese). Parity was categorised as: (1) 'none'; (2) 1-2; (3) 3 or more. The mean stress level, defined, validated and calculated by ALSWH, based on stress felt in the last 12 months around 11 life domain items was categorised as: (1) 'Not applicable/Not at all stressed'; (2) 'Somewhat stressed'; (3) 'Moderately stressed'; (4) 'Very stressed'; (5) 'Extremely stressed'. Level of exercise was calculated using an algorithm based on time in last week spent in 'Walking briskly', 'Moderate leisure activity' and 'Vigorous leisure activity' data, derived from *Active Australia's National Physical Activity Survey*, categorised as: (1) 'Sedentary'; (2) 'Low'; (3) 'Moderate'; (4) 'High'. Current contraceptive use had a binary code, based on a positive response to any of the following, 'I use the oral contraceptive pill' (survey 4) and 'I use a combined oral contraceptive pill'/I use a progestogen only oral contraceptive pill/I use the oral contraceptive pill but I don't know what type' (surveys 5 &6) and/or 'I use an implant' (all surveys). Ethnicity was categorised according to

country of birth as: (1) 'Australia'; (2) 'Other English-speaking background'; (3) 'Europe'; (4) 'Asia' (excluding the Middle East); (5) 'Other'.

5.3.2.5 Statistical Analysis

Longitudinal regression modelling was conducted using generalised estimating equations (GEEs). GEEs are an extension of generalised linear models that allow for the analysis of data longitudinally, thus reflecting the relationship between the longitudinal development of the association between CPPD symptom and CAM practitioner or CAM therapy use in non-pregnant respondents over the different survey timeframes, taking into account the significant confounding variables identified. Analyses were achieved using the statistical package STATA 14.0 and due to the large sample size, statistical significance was set at $p < 0.005$. The Wald statistic was used to assess the fit of the multivariable models.

No interactions were examined.

5.3.3 Results

The prevalence rates for endometriosis (mean = 4.0%), irregular periods (mean = 20.9%) and severe period pain (mean = 23.7%) recorded over the three surveys appeared largely unaffected by age change (Table 5.2). Prevalence of PMS was highest in 2012, averaged 36.0% between 2006 and 2009 and rose to 41.4% in 2012. Similarly, the prevalence of heavy periods showed little change between 2006 and 2009 (mean = 22.8 %) but increased to 29.9% by 2012.

All multivariate analyses were adjusted for co-morbidities of diabetes, hypertension, anaemia, asthma, depression, and anxiety and for demographics of area of residence, marital status, educational status, ability to manage on income, body-mass index, parity, stress, exercise level, oral/implant contraceptive use and ethnicity**.** Over the seven-year time period, women with endometriosis were more likely to have consulted with a massage therapist (OR=1.26; 95% CI:1.08, 1.47), nearly twice as likely

to have consulted with an acupuncturist (OR=1.88; 95% CI: 1.51, 2.35) and over 50% more likely to have consulted a naturopath/herbalist (OR=1.54; 95% CI: 1.26, 1.88), compared to women who had not been diagnosed with endometriosis (Table 5.3). Statistically significant associations were found between PMS and consultation with a naturopath/herbalist only. Specifically, these consultations were more likely for women who sometimes (OR=1.23; 95% CI: 1.09, 1.40) or often (OR=1.48; 95% CI: 1.27, 1.74) suffered PMS, compared to non-sufferers (Table 5.3).

Table 5.2. The Prevalence of Menstrual Problem in non-pregnant women in 2006, 2009 and 2012

Menstrual Problem	Survey 4 (2006) (n=9145)	Survey 5 (2009) (n=8200)	Survey 6 (2012) (n=8010)
Endometriosis			
Sample size	7704	6835	7340
Prevalence (%)	3.8	4.4	3.7
PMS*			
Sample size	8105	7286	7426
Prevalence (%)	36.9	35.0	41.4
Irregular periods			
Sample size	8109	7267	7429
Prevalence (%)	21.1	19.3	22.2
Heavy periods			
Sample size	8108	7267	7438
Prevalence (%)	23.1	22.5	29.9
Severe period pain			
Sample size	8117	7279	7436
Prevalence (%)	24.7	22.2	24.2

* PMS – premenstrual syndrome.

Women who had irregular periods were no more likely to have consulted with any CAM practitioner compared to those who never had irregular periods whilst those who often had heavy periods were less likely to consult with an osteopath (OR=0.64; 95% CI: 0.49, 0.83) compared to those who never had heavy periods. Women who sometimes had severe period pain were less likely to consult with a

naturopath/herbalist (OR=0.78; 95% CI: 0.67, 0.91) than those women who reported they never had this symptom.

The likelihood that any woman consulted with a CAM practitioner increased from 2006 to 2009 for a chiropractor (OR=1.25; 95% CI: 1.15, 1.36), an osteopath (OR=1.64; 95% CI: 1.42, 1.90), a massage therapist (OR=1. 36; 96% CI: 1.27, 1.46) and/or an acupuncturist (OR=1.84; 95% CI: 1.59, 2.12). In 2012, across the cohort, the likelihood of CAM practitioner consultation increased for a chiropractor (OR=1.28; 95% CI: 1.17, 1.41), an osteopath (OR=1.71; 95% CI: 1.48, 1.98), a massage therapist (OR=1.41; 95% CI: 1.30, 1.52) and/or an acupuncturist (OR=1. 59; 95% CI: 1.37, 1.85) compared to 2006 data. The prevalence data for use of CAM practitioners by women with CPPD in 2012 showed that a chiropractor, an osteopath, a massage therapist, an acupuncturist and a naturopath/herbalist had been visited by 0.9%, 0.4%, 1.9%, 0.6% and 0.7% respectively by women with endometriosis; 8.4%, 3.8%, 18.8%, 4.3% and 5.8% respectively for women who sometimes or often had PMS; 4.8%, 1.7%, 10.0%, 2.2% and 3.1%, respectively for those who sometimes or often had irregular periods; 5.8%, 2.5%, 12.5%, 2.8% and 4.0% respectively for those who sometimes or often suffered heavy periods and 4.8%, 2.2%, 10.4%, 2.6% and 3.1% respectively for those who sometimes or often reported painful periods (Table 5.3).

Women with endometriosis were significantly more likely to have used vitamins/minerals (OR=1.40; 95% CI: 1.17, 1.67), yoga/meditation (OR=1.35; 95% CI: 1.13, 1.60), herbal medicines (OR=1.34; 95% CI: 1.13, 1.60) and Chinese medicines (OR=1.99; 95% CI: 1.53, 2.58) compared to those without endometriosis (Table 5.4).

Compared to never sufferers of PMS those who rarely had symptoms were more likely to use herbal medicines (OR=1.21; 95% CI: 1.09, 1.34), with the likelihood increasing for sometimes sufferers (OR=1.33; 95% CI: 1.21, 1.48). Women who reported they sometimes experienced PMS were also more likely to have used yoga/meditation (OR=1.16; 95% CI: 1.05, 1.28) and aromatherapy (OR=1.26; 95% CI: 1.14, 1.40) than those who never had PMS. Most CAM therapies/products were more likely to be used by women who reported having PMS often compared to those who never suffered;

specifically vitamins/minerals (OR=1.21; 95% CI: 1.08, 1.37), yoga/meditation (OR=1.27; 95% CI: 1.12, 1.45), herbal medicines (OR=1.48; 95% CI: 1.30, 1.69), and/or aromatherapy (OR=1.26; 95% CI: 1.11, 1.44).

Women who indicated sometimes or often having had irregular periods or heavy periods were not more or less likely to use any CAM therapies/products. Women who often suffered severe period pain were more likely to use aromatherapy (OR=1.34; 95% CI: 1.13, 1.58) compared to those who had not suffered from severe period pain.

From 2006, for all women, the likelihood increased in 2009 and 2012 of using vitamins/minerals (OR=1.21; 95% CI: 1.13, 1.31) and (OR=1.26; 95% CI: 1.15, 1.37) respectively, yoga/meditation (OR=1.15; 95% CI:1.05,1.26) and (OR=1.21; 95% CI:1.10,1.32) respectively and Chinese medicines (OR=1.61; 95% CI: 1.35, 1. 93) and (OR=1.49; 95% CI: 1.24, 1.79) respectively. Herbal medicine use increased slightly in 2009 only, when compared to 2006 (OR=1.17; 95% CI:1.08, 1.28). However, for aromatherapy this likelihood decreased in 2009 (OR=0.83; 95% CI: 0.76, 0.90) and declined still further in 2012 (OR=0.70; 95% CI: 0.64, 0.77), compared to 2006. Prevalence data showed that vitamins/minerals, yoga /meditation, herbal medicines, aromatherapy and Chinese medicines were used by 2.9%, 1.3%, 1.1%, 0.7% and 0.4% respectively by women with endometriosis. For those women who sometimes or often had PMS the respective prevalences of use were 29.7%, 10.9%, 10.2%, 8.3% and 2.7%; for those who sometimes or often had irregular periods these were 15.8%, 5.5%, 5.3%, 4.0% and 1.6%; for those who sometimes or often suffered heavy periods these were 20.9%, 7.1%, 7.2%, 5.8% and 1.8% and for those who sometimes or often reported painful periods these were 17.3%, 6.2%, 6.2%, 5.4% and 1.6% (Table 5.5).

5.3.4 Discussion

Our study, based on a large, representative sample of young Australian women, was the first as far as we are aware, to have analysed changes of CAM use in relation to various menstrual problems spanning the age range from 28 - 33 years through to 34 -

39 years. CAM use by women suffering CPPD reflected the general growth in interest and information regarding CAM, much likely derived from non-professional sources (Frawley, Jane et al., 2014), over a seven year timeframe and represents important data for healthcare providers and policy makers (Vos et al., 2015).

Our findings confirmed the high prevalence and consequent significance of CPPD for women's health previously reported (Lee, D. Y. et al., 2010; Sharp et al., 2002; Wittchen et al., 2002). Data from our young cohort, aged over the seven-year time-frame, represent a valuable insight into possible changes in CPPD with age during this relatively young period of women's lives but as previous studies have largely employed longer time frames corroboration awaits further research.

5.3.4.1 Prevalence of CPPD

Across 2006 to 2012 the consistent prevalence of endometriosis (mean=4.0%) accords with a reported level of 4.8% (Vos et al., 2015), however the choice for a diagnosis made in the previous 3 years rather than the currently accepted 5-year span may have under-estimated its prevalence and may complicate comparisons. Whilst not equivocal the relationship between increasing age and endometriosis according to recently published data suggest no correlation exists (Viganò, Parazzini, Somigliana, & Vercellini, 2004).

Our cohort's prevalence of irregular periods (mean=20.9%) accorded with a reported level of 25.6% (Hahn et al., 2013) again showing no consistent age-related trend. Menstrual cycle irregularity may decrease with age (Hahn et al., 2013) although a large European study found a consistent prevalence across age groups, rising after 42 years of age, around peri-menopause (Svanes et al., 2005).

Severe dysmenorrhoea levels over the three surveys in our study appeared unaffected by aging, the mean=23.7% compared to 2% - 29% previously reported (Ju, Hong et al., 2014). Dysmenorrhoea has a high prevalence in under 30-year olds usually diminishing

with age (Ju, Hong et al., 2014). Variations in definition of 'severity', ('interfering with daily activity or efficiency' (Weissman et al., 2004), 'activity inhibited and lack of relief from analgesics' (Sundell et al., 1990), 'absenteeism from work' (Dawood, 2006) and reliance on subjective pain assessment complicates comparisons across studies relating age to dysmenorrhoea severity (Ju, Hong et al., 2014). In addition, the scant published data on severe dysmenorrhoea reported largely on younger women than our cohort. Nevertheless, factors such as parity, age at menarche, lifestyle and weight appear to be significant determinants of changes in dysmenorrhoea, prevalence being age-related for women under 30 years old, a group mostly younger than our cohort (Weissman et al., 2004), (Harlow & Park, 1996; Latthe, Mignini, Gray, Hills, & Khan, 2006; Sundell et al., 1990). A longitudinal US study into dysmenorrhoea in women comparable in age with our cohort estimated severe dysmenorrhoea prevalence at 2%, and whilst it declined with age, again parity was a more significant factor (Weissman et al., 2004).

With regard to prevalence of heavy periods, a systematic review estimated this ranged between 10% - 30% (Liu et al., 2007), consistent with our mean of 25.2%. We found menorrhagia prevalence increased with age, supported by a French College of Obstetricians and Gynaecologists guideline review suggesting a prevalence peak of 24% in women aged 36 - 40 years (Marret et al., 2010). Pooled data from a systematic review of PMS prevalence, averaged it at 47.8%, albeit with an extremely broad range (10 -98%) (Direkvand-Moghadam et al., 2014). This average is higher than that found in our surveys, 2006 and 2009, but comparable with the 41.4% reported by the 2012 survey. Scant current prevalence data exists relating PMS to ageing but reported patterns of higher PMS levels with age (Adewuya, Loto, & Adewumi, 2009; Merikangas et al., 1993) and a recent, large general population study of UK women aged 12-50 years having a peak prevalence in the 35 - 39 year age-group (Sammon, Nazareth, & Petersen, 2016) support our observed age increase.

5.3.4.2 CAM use and CPPD

Over time, our study found women with endometriosis may have been more likely to visit a massage therapist, an acupuncturist and/or a naturopath/herbalist and with the exception of aromatherapy, may also have been more likely to have used all CAM and in particular Chinese medicine, compared to those without endometriosis. Scientific validation exists for benefits from acupuncture (Lund & Lundeberg, 2016) and Chinese herbal medicine (Ding & Lian, 2015; Wieser et al., 2007) in treating pain and poor fertility associated with endometriosis, but none to-date for therapeutic massage or naturopathic/western herbalist treatment. However a small cross-sectional study into endometriosis associated leg pain found 79%, 67% and 50% of women using massage, acupuncture and herbs respectively reported improvement in pain level (Missmer & Bove, 2011).

From our analysis, women with PMS appeared more likely, over time, to visit a naturopath/herbalist compared with non-sufferers. Compared to non-sufferers of PMS, women who sometimes experienced PMS were also more likely users of yoga/meditation, herbal medicine or aromatherapy, but those often suffering PMS increased their use of all CAM self-help therapies and products surveyed except Chinese medicines. CAM clinical trials have indicated supplements (calcium, magnesium (Fugh-Berman & Kronenberg, 2003) and fish oils (Perry, Judge, Millar, & McDonald, 2015)), herbs (*Vitex agnus castus*) (Fugh-Berman & Kronenberg, 2003), yoga (Wu, Lin, Chu, & Liang, 2015) and aromatherapy (lavender) (Matsumoto et al., 2013b) are potentially helpful for PMS. Whilst evidence exists that Chinese herbal medicine may be beneficial (Huang, Liu, Yang, Feng, & Wang, 2012), users of this CAM with PMS in our study were too few to indicate a significant association. General support for the efficacy of CAM in treating PMS has been reported in previous surveys where between 37% - 97% women estimated an improvement in symptoms (Brown, M. A. & Zimmer, 1986; Corney & Stanton, 1991; Domoney et al., 2003a; Leather et al., 1993; Pullon, S.R. et al., 1989). Indirect support for individual CAM modalities in PMS treatment exists from cross-sectional studies where women reported using osteopathy (Brown, M. A. & Zimmer, 1986), chiropractic (Brown, M. A. & Zimmer, 1986), vitamins/minerals (Campbell, E. M., Peterkin, O'Grady, et al., 1997; Corney & Stanton, 1991; Domoney et al., 2003a; Hamaideh et al., 2014; Kraemer & Kraemer,

1998; Leather et al., 1993; Pullon, S.R. et al., 1989; Sternfeld et al., 2002), massage (Campbell, E. M., Peterkin, O'Grady, et al., 1997; Pullon, S.R. et al., 1989; Sternfeld et al., 2002; Tolossa & Bekele, 2014), yoga/meditation (Pullon, S.R. et al., 1989; Sternfeld et al., 2002), Chinese herbs (Domoney et al., 2003a), acupuncture (Domoney et al., 2003a), aromatherapy (Domoney et al., 2003a) and western herbs (Domoney et al., 2003a; Hamaideh et al., 2014; Sternfeld et al., 2002) for symptom relief. More research into these CAM as treatment approaches appears warranted.

No published clinical evidence relates efficacy of CAM treatment to irregular periods, although national Taiwanese health database records cited 'menstruation disorders' amongst the main reasons for prescribing Chinese herbal medicine (Hsieh et al., 2008). Our study found no positive association of CAM use with irregular menses or heavy periods. The physical and social discomfort associated with heavy periods may account for the reduced likely visit of women who often experience them to an osteopath, with a non-significant trend away from other forms of CAM that require particular dress codes and/or need for personal interaction such as massage therapy, chiropractic, acupuncture and yoga/ meditation. Previous studies on women with self-reported menorrhagia (Chapple, 1999) and/or gynaecological problems associated with heavy bleeding including general pelvic problems (Kuppermann et al., 2007) and fibroids (Adegbesan-Omilabu et al., 2014b; Borah et al., 2013; Kronenberg et al., 2006; Tanaka et al., 2014)**,** found an associated use of a variety of CAM including herbs, acupuncture, dietary supplements and Chinese medicine. Our analyses did not reflect this.

The relative lack of CAM use by those in our cohort with either irregular periods and/or heavy periods may be due to lack of knowledge in Australia about their potential benefits as in countries where CAM is part of mainstream health provision, such as Taiwan and Korea, there is a strong traditional use and acceptance of Chinese medicine to treat these problems (Cheng, 2011a; Lee, D. Y. et al., 2010). In addition, unlike PMS and dysmenorrhoea which occur commonly, both cycle irregularity and menorrhagia may be perceived as having potentially serious underlying pathologies (Busby, 2013) and/or consequences for conception and vitality for which diagnosis and

treatment are regarded as more appropriately dealt with through conventional medicine.

Scientific evaluation of CAM for dysmenorrhoea is sparse, but support does exist for yoga (Rakhshaee, 2011), herbs (Pattanittum et al., 2016), aromatherapy (Sadeghi Aval Shahr et al., 2015) and Chinese herbal medicines (Pan et al., 2014; Zhu, Proctor, Bensoussan, Smith, & Wu, 2008). Cross-sectional studies suggest women use vitamins and minerals (Chia, Lai, Cheung, Kwong, Lau, & Leung, 2013; Kuppermann et al., 2007), herbs (Abdul-Razzak et al., 2010; Cheng, 2011a; Cheng & Lin, 2011; Chia, Lai, Cheung, Kwong, Lau, & Leung, 2013; Kuppermann et al., 2007; Lee, D. Y. et al., 2010; Tariq et al., 2009) and massage (Brito et al., 2012; Seven et al., 2014) regardless of scientific validation. Our study showed no associated CAM use by women with dysmenorrhoea except an apparent reduction in association between dysmenorrhoea sometimes experienced and visits with a naturopath/herbalist. This finding contrasted with more widespread CAM use for endometriosis sufferers because although dysmenorrhoea is a predominant symptom it is secondary to the disease whereas primary dysmenorrhoea may be normalised in menstruation and therefore tolerated (Hylan et al., 1999) and/or treated using non-CAM self-help remedies such as hot drinks, heat and exercise (Brito et al., 2012; Chia, Lai, Cheung, Kwong, Lau, & Leung, 2013; Kuppermann et al., 2007; Pullon, S.R. et al., 1989). The only CAM therapies and products associated with dysmenorrhoea experienced often was the use of aromatherapy, a practice for which some clinical evidence exists (Ou et al., 2012). Regular, monthly severe pain relief may be considered too expensive for regular CAM practitioner treatment and given its uncertain aetiology self-treatment with a wide-range of both non-pharmacological and pharmacological strategies is known to commonly occur (Domoney et al., 2003a; Hylan et al., 1999).

5.3.4.3 Prevalence of CAM use

From 2006 to 2012 the significant increased visits to a chiropractor, an osteopath and an acupuncturist, by all women in our study, may relate to their subsidized coverage

by Medicare and private health insurers to which an increasing number of Australians have subscribed (Engel, Brown, Swain, & Lystad, 2014; Xue et al., 2008). Referrals from medical practitioners to osteopaths, chiropractors, acupuncturists and massage therapists (Wardle, J. L., Sibbritt, & Adams, 2013b; Xue et al., 2008), the relative decreased cost from 2007 to 2012 for chiropractor visits (Engel et al., 2014), increased practice of both acupuncture and massage therapy by medical professionals (Cohen, Penman, Pirotta, & Da Costa, 2005; Xue et al., 2008) and the high accessibility of massage therapists who far outnumber other CAM practitioners (Grace, 2012) are also likely to have increased their uptake.

Over the study period visits decreased overall by 13% to a naturopath/herbalist, a practitioner-based CAM requiring either private health insurance or out-of-pocket funding in Australia and for which over-the-counter products are easily self-prescribed. Against this background, women with endometriosis and/or PMS in our study were more likely to have increased their visits to a naturopath/herbalist compared to women not suffering these symptoms, strongly suggesting significant treatment benefits associated with women receiving this professional guidance. An anomalous UK finding noting prescription-related PMS diagnoses by general practitioners decreased four-fold between 1993 - 1998, whilst PMS was the second most common condition treated by UK herbalists in 1998, led its authors to suggest women were by-passing conventional medicine in favour of CAM treatment (Wyatt et al., 2002). An updated survey showed levels of conventional prescriptions in the UK for CPPD-related problems were still declining (Sammon et al., 2016), indicating women may be continuing to self-treat or to seek help beyond conventional medicine. It is possible that herbal medicine has been an effective option for PMS, explaining its increased uptake. Whilst aromatherapy use declined substantially over the timeframe of our study, this was not mirrored by women suffering PMS, suggesting it too may be an effective treatment. Clearly more research is needed into the role of these CAM in PMS treatment.

According to data from our study, the use of self-prescribed CAM was higher than the use of CAM practitioner services, behaviour identified elsewhere (Campbell, E. M.,

Peterkin, O'Grady, et al., 1997; Kristoffersen et al., 2014; Leather et al., 1993). Chinese medicine practitioners' registration by the Australian government in 2005 (Zhou et al., 2012), officially 'recognising' this modality, may explain our finding that Chinese medicine use increased.

Acupuncture use is possibly under-reported in our data. Two-thirds of Chinese Medicine Board of Australia registered practitioners use acupuncture with Chinese herbal medicine, a category not identified in ALSWH surveys. Additionally, other practitioners such as osteopaths, chiropractors, medical doctors and physiotherapists also administer acupuncture but may have been unidentified by survey respondents as acupuncture-orientated visits (Zheng, 2014).

5.3.4.4 Health policy implications

CAM use is higher amongst chronic ill-health sufferers, women and those whose medical problems are not well addressed by conventional treatment (Williams et al., 2011). Women suffering CPPD clearly satisfy these criteria and are likely to continue using CAM. Medical reviews acknowledge that CPPD treatment is largely functional or symptomatic relying on hormone replacement therapy, surgery, angiogenesis inhibitors, immune modulators, anti-depressants and/or analgesics with limited efficacy, possible side-effects and most importantly perhaps, for this cohort, are often unsuitable for women intending to conceive (Prast et al., 2013; Vercellini et al., 2008). Over 300 treatment strategies are currently offered by CHPs for CPPD indicating their complexity and individual nature (Kaunitz et al., 2008; Wyatt et al., 2002). At the same time traditional Chinese (Hsieh et al., 2008; Pan et al., 2014) and Western conventional medical practitioners recommend CAM such as vitamin B_6, herbal, homeopathic and nutritional supplements, to their CPPD patients (Domoney et al., 2003a; Gordon et al., 1998; Pullon, S.R. et al., 1989; Wyatt et al., 2002). It is therefore in the interest of women, health providers and health policymakers to investigate the role of CAM in

Table 5.3. The odds ratio* for association of cyclic perimenstrual pain and discomfort and consultations with complementary and alternative medicine practitioners

Cyclic Perimenstrual Pain and Discomfort Symptom	Chiropractor	Osteopath	Massage Therapist	Acupuncturist	Naturopath/herbalist
	Odds Ratio (C.I.) (n=9719)	Odds Ratio (C.I.) (n=9716)	Odds Ratio (C.I.) (n=9717)	Odds Ratio (C.I.) (n=9717)	Odds Ratio (C.I.) (n=9716)
Endometriosis					
No (reference)	1.00	1.00	1.00	1.00	1.00
Yes [C,D,E]	1.21 (1.01,1.43)	1.13 (0.86,1.48)	1.23 (1.07,1.43)	1.97 (1.59,2.44)	1.54 (1.27,1.87)
PMS**					
Never (reference)	1.00	1.00	1.00	1.00	1.00
Rarely	1.03 (0.93,1.13)	1.14 (0.98,1.32)	1.11 (1.02,1.19)	1.07 (0.93,1.25)	1.15 (1.02,1.31)
Sometimes [C,E]	0.97 (0.89,1.07)	1.02 (0.88,1.19)	1.14 (1.06,1.23)	1.11 (0.96,1.28)	1.30 (1.15,1.47)
Often [C,E]	0.95 (0.84,1.08)	1.27 (1.04,1.54)	1.25 (1.12,1.38)	1.28 (1.07,1.55)	1.60 (1.38,1.86)
Irregular cycle					
Never (reference)	1.00	1.00	1.00	1.00	1.00
Rarely	0.94 (0.85,1.04)	1.00 (0.85,1.18)	0.95 (0.87,1.03)	1.07 (0.91,1.25)	1.06 (0.93,1.22)
Sometimes [E]	1.08 (0.98,1.21)	0.91 (0.76,1.09)	1.06 (0.97,1.16)	1.04 (0.88,1.23)	1.25 (1.09,1.42)
Often[E]	0.95 (0.83,1.08)	1.03 (0.84,1.26)	0.99 (0.89,1.10)	1.17 (0.97,1.41)	1.28 (1.10,1.49)
Heavy periods					
Never (reference)	1.00	1.00	1.00	1.00	1.00
Rarely	1.02 (0.92,1.13)	0.86 (0.73,1.02)	0.97 (0.89,1.06)	0.96 (0.82,1.14)	0.95 (0.83,1.10)
Sometimes	0.96 (0.86,1.08)	0.82 (0.68,0.98)	0.91 (0.83,1.00)	0.85 (0.71,1.02)	1.00 (0.86,1.15)
Often [B,C]	0.90 (0.77,1.05)	0.64 (0.49,0.82)	0.80 (0.70,0.91)	0.76 (0.60,0.95)	0.90 (0.75,1.09)
Painful periods					
Never (reference)	1.00	1.00	1.00	1.00	1.00
Rarely [C]	0.99 (0.90,1.10)	1.01 (0.86,1.18)	1.13 (1.04,1.22)	1.13 (0.97,1.32)	0.98 (0.86,1.11)
Sometimes	1.07 (0.95,1.21)	1.02 (0.84,1.24)	1.03 (0.94,1.14)	1.11 (0.92,1.32)	0.83 (0.71,0.96)
Often	0.98 (0.82,1.16)	1.38 (1.07,1.78)	1.09 (0.95,1.25)	1.30 (1.02,1.65)	1.13 (0.93,1.37)
Time					
Survey 4 (reference)	1.00	1.00	1.00	1.00	1.00
Survey 5 [A,B,C,D]	1.20 (1.12,1.28)	1.39 (1.24,1.57)	1.15 (1.09,1.22)	1.45 (1.28,1.63)	0.91 (0.83,1.00)
Survey 6 [A,B,C,D,E]	1.34 (1.25,1.43)	1.65 (1.46,1.84)	1.22 (1.15,1.29)	1.48 (1.31,1.66)	0.85 (0.78,0.94)

[A] statistically significant association with chiropractor
[B] statistically significant association with osteopath
[C] statistically significant association with massage therapist
[D] statistically significant association with acupuncturist
[E] statistically significant association with naturopath/herbalist

*Adjusted for co-morbidities of diabetes, hypertension, anaemia, asthma, depression and anxiety and for demographics of area of residence, marital status, educational status, ability to manage on income, body-mass index, parity, stress, level of exercise, oral/implant contraceptive use and ethnicity. All models have a Wald statistic p value <0.005.**PMS -premenstrual syndrome.

Table 5.4. Prevalence of cyclic perimenstrual pain and discomfort symptom and use of complementary and alternative medicine practitioners in 2012

Cyclic Perimenstrual Pain and Discomfort Symptom	Chiropractor		Osteopath		Massage therapist		Acupuncturist		Naturopath/Herbalist	
	No (n=5,980)	Yes (n=1,493)	No (n=6,849)	Yes (n=624)	No (n=4,305)	Yes (n=3,168)	No (n=6,799)	Yes (n=674)	No (n=6,628)	Yes (n=845)
	%	%	%	%	%	%	%	%	%	%
Endometriosis										
No	77.3	19.0	88.3	8.0	55.9	40.5	87.8	8.5	85.6	10.7
Yes	2.8	0.9	3.3	0.4	1.8	1.9	3.1	0.6	3.0	0.7
PMS										
Never	30.3	7.2	34.7	2.8	22.9	14.6	34.7	2.8	34.2	3.2
Rarely	16.7	4.4	19.3	1.8	12.0	9.1	19.2	1. 9	19.0	2.2
Sometimes	22.5	5.8	26.0	2.4	15.7	12.7	25.5	2.8	24.9	3.5
Often	10.5	2.6	11.6	1.4	6.9	6.1	11.6	1.5	10.7	2.3
Irregular Periods										
Never	49.0	12.3	56.0	5.3	35.4	25.9	56.0	5.2	55.0	6.2
Rarely	13.5	2.9	15.1	1.3	9.8	6.6	14.9	1.6	14.5	2.0
Sometimes	10.3	3.0	12.3	1.0	7.1	6.2	12.1	1.2	11.5	1.8
Often	7.2	1.8	8.3	0.7	5.2	3.8	8.0	1.0	7.7	1.3
Heavy Periods										
Never	42.4	10.3	48.1	4.5	30.4	22.2	48.0	4.7	47.4	5.2
Rarely	13.6	3.9	16.2	1.3	9.7	7.8	16.0	1.5	15.4	2.1
Sometimes	15.0	3.5	16.9	1.6	10.6	7.9	16.8	1.7	16.2	2.3
Often	9.0	2.3	10.5	0.9	6.8	4.6	10.2	1.1	9.7	1.7
Painful Periods										
Never	42.5	10.6	48.8	4.3	31.5	21.7	48.8	4.3	47.7	5.4
Rarely	17.9	4.7	20.8	1.8	12.4	10.3	20.5	2.1	19.9	2.8
Sometimes	13.2	3.1	14.9	1.4	9.2	7.0	14.7	1.6	14.5	1.7
Often	6.3	1.7	7.2	0.8	4.5	3.4	7.0	1.0	6.6	1.4

Table 5.5. The odds ratio* for association between cyclic perimenstrual pain and discomfort and use of complementary and alternative medicine therapies and products

Cyclic Perimenstrual Pain and Discomfort Symptom	Vitamins/minerals Odds Ratio (C.I.) (n=9268)	Yoga/meditation Odds Ratio (C.I.) (n=9267)	Herbal medicines Odds Ratio (C.I.) (n=9264)	Aromatherapy Odds Ratio (C.I.) (n=9264)	Chinese medicines Odds Ratio (C.I.) (n=9263)
Endometriosis					
No (reference)	1.00	1.00	1.00	1.00	1.00
Yes[A,B,C,E]	1.43 (1.19,1.71)	1.33 (1.12,1.59)	1.34 (1.12,1.59)	1.12 (0.93,1.35)	1.98 (1.51,2.59)
PMS**					
Never (reference)	1.00	1.00	1.00	1.00	1.00
Rarely[C,]	0.96 (0.88,1.04)	1.08 (0.98,1.20)	1.21 (1.09,1.35)	1.09 (0.98,1.21)	1.17 (0.95,1.43)
Sometimes,[B,C,D]	1.04 (0.95,1.13)	1.16 (1.05,1.28)	1.34 (1.21,1.49)	1.28 (1.15,1.41)	1.19 (0.98,1.45)
Often [A,B,C,D]	1.21 (1.08,1.37)	1.27 (1.11,1.45)	1.49 (1.30,1.69)	1.27 (1.11,1.45)	1.32 (1.04,1.69)
Irregular Periods					
Never (reference)	1.00	1.00	1.00	1.00	1.00
Rarely	1.08 (0.98,1.18)	0.98 (0.88,1.09)	1.03 (0.93,1.15)	1.04 (0.93,1.16)	1.04 (0.84,1.28)
Sometimes	1.11 (1.00,1.23)	1.13 (1.01,1.27)	1.07 (0.95,1.20)	1.09 (0.98,1.23)	1.29 (1.05,1.59)
Often	1.10 (0.98,1.25)	1.02 (0.89,1.17)	1.08 (0.94,1.23)	0.95 (0.83,1.09)	1.21 (0.95,1.54)
Heavy Periods					
Never (reference)	1.00	1.00	1.00	1.00	1.00
Rarely	1.02 (0.93,1.13)	1.01 (0.90,1.12)	0.97 (0.87,1.09)	0.97 (0.87,1.09)	1.01 (0.81,1.25)
Sometimes	0.95 (0.86,1.06)	0.99 (0.88,1.12)	1.04 (0.92,1.17)	0.93 (0.83,1.05)	0.88 (0.70,1.10)
Often	0.91 (0.79,1.05)	0.85 (0.72,1.00)	1.05 (0.90,1.23)	0.91 (0.78,1.07)	0.84 (0.63,1.13)
Painful Periods					
Never (reference)	1.00	1.00	1.00	1.00	1.00
Rarely	0.90 (0.83,0.99)	0.97 (0.88,1.08)	0.97 (0.87,1.08)	1.02 (0.91,1.13)	1.07 (0.87,1.31)
Sometimes	0.96 (0.86,1.07)	1.00 (0.89,1.13)	0.96 (0.85,1.09)	1.10 (0.97,1.24)	1.05 (0.83,1.33)
Often [D]	0.96 (0.82,1.12)	1.24 (1.05,1.47)	1.19 (1.00,1.40)	1.33 (1.13,1.58)	1.47 (1.09,1.99)
Time					
Survey 4 (reference)	1.00	1.00	1.00	1.00	1.00
Survey 5 [A,B,C,D.E]	1.21 (1.12,1.31)	1.16 (1.06,1.27)	1.18 (1.08,1.29)	0.83 (0.76,0.91)	1.63 (1.36,1.95)
Survey 6 [A,B,D,E]	1.25 (1.15,1.36)	1.20 (1.10,1.32)	1.06 (0.97,1.17)	0.70 (0.64,0.77)	1.51 (1.26,1.81)

[A] statistically significant association with vitamins/ minerals
[B] statistically significant association with yoga or meditation
[C] statistically significant association with herbal medicines
[D] statistically significant association with aromatherapy oils
[E] statistically significant association Chinese medicines

*Adjusted for co-morbidities of diabetes, hypertension, anaemia, asthma, depression and anxiety and for demographics of area of residence, marital status, educational status, ability to manage on income, body-mass index, parity, stress, level of exercise, oral/implant contraceptive use and ethnicity. All models have a Wald statistic p value <0.005.**PMS -premenstrual syndrome.

Table 5.6. Prevalence of cyclic perimenstrual pain and discomfort symptom and use of complementary and alternative medicine therapies and products in 2012

Cyclic Perimenstrual Pain and Discomfort Symptom	Vitamins/Minerals		Yoga/Meditation		Herbal medicines		Aromatherapy oils		Chinese medicines	
	No (n=2,384)	Yes (n=5,043)	No (n=5,713)	Yes (n=1,714)	No (n=5,927)	Yes (n=1,500)	No (n=6,224)	Yes (n=1,203)	No (n=7,024)	Yes (n=403)
	%	%	%	%	%	%	%	%	%	%
Endometriosis										
No	31.2	65.1	74.5	21.8	77.1	19.2	80.8	15.5	91.2	5.1
Yes	0.8	2.9	2.4	1.3	2.6	1.1	3.0	0.7	3.3	0.4
PMS										
Never	13.1	24.3	29.9	7.5	31.6	5.8	32.7	4.7	35.7	1.6
Rarely	7.3	13.9	16.5	4.7	17.1	4.1	18.0	3.2	20.1	1.1
Sometimes	8.3	20.1	21.4	7.1	21.9	6.5	23.0	5.4	26.8	1.7
Often	3.4	9.6	9.1	3.8	9.3	3.7	10.1	2.9	12.0	1.0
Irregular Periods										
Never	20.6	40.6	47.4	13.9	49.8	11.4	51.9	9.3	58.3	2.9
Rarely	5.0	11.5	12.8	3.7	13.1	3.4	13.6	2.9	15.6	0.9
Sometimes	3.8	9.6	9.8	3.5	10.1	3.2	11.0	2.4	12.4	0.9
Often	2.7	6.2	6.9	2.0	6.9	2.1	7.3	1.6	8.3	0.7
Heavy Periods										
Never	17.6	35.0	40.8	11.8	43.2	9.4	45.0	7.6	49.9	2.7
Rarely	5.5	12.0	13.3	4.2	13.9	3.6	14.6	2.9	16.6	0.9
Sometimes	5.6	12.9	14.1	4.5	14.4	4.1	15.0	3.5	17.6	1.0
Often	3.4	8.0	8.7	2.6	8.3	3.1	9.1	2.3	10.5	0.8
Painful Periods										
Never	17.5	35.6	41.6	11.6	44.0	9.1	45.9	7.2	50.6	2.5
Rarely	7.6	15.1	17.4	5.2	17.9	4.8	19.0	3.6	21.4	1.3
Sometimes	4.8	11.4	12.3	3.9	12.5	3.7	12.9	3.4	15.3	0.9
Often	2.1	5.9	5.7	2.3	5.5	2.5	6.0	2.0	7.3	0.7

this significant area of women's health.

5.3.4.5 Study limitations

When interpreting these study findings, readers should be mindful of some limitations. Whilst the demographic profile of 'young' age participants initially recruited by ALWSH was considered representative when compared to 1996 consensus data it is possible, due to the relatively poor retention rate from the original sample, that some bias has been introduced and that our cohort may be viewed as unrepresentative thereby reducing the generalizability of our results and possibly distorting prevalence of CPPD data and the associated CAM use. Retrospective reporting by ALSWH participants regarding both CPPD symptoms and CAM use raises possible recall bias. Reporting of CPPD symptoms was subjective and the lack of standardised instruments and CAM terminology in the surveys may have resulted in classification errors and difficulties in cross study comparisons. In particular, PMS was used interchangeably with PMT which may have led to its under-estimation or incorrect classification. Also, the use of other contraceptive devices and medications that could potentially alter menstrual symptoms could not be assessed as these data were not collected. Some response bias is recognised in baseline recruitment because women with tertiary education were over-represented and some ethnic groups under-represented. Due to lack of relevant data the study was unable to track direct changes in CPPD symptoms after CAM use. However, the large, representative sample and data tracking this important timeframe in women's reproductive lives provide strong support for the validity of our findings.

5.3.5 Conclusion

Large numbers and proportions of women suffer CPPD with prevalence of PMS and heavy periods apparently increasing with age. This study demonstrates many women with CPPD symptoms are self-medicating, using a range of CAM, possibly without professional oversight. Increasing use of specific CAM by women with CPPD from 2006 to 2012 suggests some CAM has untapped potential to significantly benefit these

prevalent, disruptive health problems. Given the large cost to women, their families and society it is important for healthcare providers and policy makers to gain information into the types of alternative treatments being adopted, their efficacy and risk factors. CAM is a promising area of treatment for chronic CPPD and there is much to be gained by further research.

5.4 Chapter summary

Data analysed in this Chapter has added to the limited knowledge of potential changes in CPPD prevalence in women within the same cohort as they aged over a seven-year period; demonstrating that the prevalence levels of CPPD remained high throughout the period. In addition, the changes in the association between the use of specific CAM by women with CPPD has been further explored in this Chapter, extending the significance of these associations. Women with heavy periods do not appear to be associated with any CAM use at all, whilst those women suffering from irregular periods and dysmenorrhoea had limited associated CAM use. By contrast, women with endometriosis and PMS were apparently using a wider variety of both practitioner-based and self-prescribed CAM. Naturopaths or herbalists and the self-prescription of herbal medicines were amongst the CAM regularly associated with women and these latter two conditions.

The following Chapter explores the treatment of CPPD from the perspective of Western herbalists to identify to what extent herbal medicine may beneficially contribute to the treatment of these prevalent women's issues.

6. Western herbalists' treatment of common menstrual problems.

6.1 Chapter introduction

Previous chapters identified that women who have menstrual cycle problems are using herbal medicines and consulting, to an extent, with Western herbalists (WHs). This Chapter further explores the potential of Western herbal medicine (WHM) to contribute to the effective treatment of major cyclic perimenstrual pain and discomfort (CPPD) problems.

The analyses presented in this Chapter are based on data provided by Australian WH members of Practitioner Research And Collaboration Initiative (PRACI) - a multi-modality practice-based research network (PBRN) that represents fourteen complementary medicine professions across Australia. Apart from providing personal and professional demographic details about themselves, participants also answered a series of questions specifically related to their perceptions and practice around four main CPPD issues, that of premenstrual syndrome, irregular periods, heavy periods and dysmenorrhoea. A copy of the questionnaire can be found in Appendix 2. The questionnaire consisted of five sections: 1) demographics; 2) general practice details; 3) practice information, specifically around the four CPPD issues; 4) practitioners' interactions with other health practitioners regarding their clients with CPPD issues; and 5) their perceptions of the clients' behaviour with respect to having their CPPD issues treated.

Therapeutic gaps currently exist in this very significant and ubiquitous area of women's health problems. Up to 40% of women fail to find conventional medical solutions that are either effective and/or acceptable (Hylan et al., 1999; Kaunitz et al., 2008; Kuppermann et al., 2007; Marjoribanks, J. et al., 2015; Sharp et al., 2002). Ineffective treatment strategies have prompted conventional medical proponents to advocate for the use of individualistic therapeutic strategies to try and improve treatment outcomes for all women (Fraser et al., 2017; Kaunitz et al., 2008; Yonkers et al., 2008). This survey of WHs treatment of the specific CPPD issues is the first such exploration of the

topic, thereby laying a foundation for more rigorous research into the potential for WHs to help to fill the recognised therapeutic gap in women's healthcare.

6.2 Background

References to the archaeological identification of the pollens of herbal medicines have led to the understanding that plants were consciously used for therapeutic purposes throughout human history (De Miranda Chaves & Reinhard, 2003; McGovern et al., 2010). Many historical, international pharmacopoeias bear testimony to the use of herbal medicines as the basis for a myriad of conventional and pharmaceutical drugs (Leonti & Verpoorte, 2017).

There are traditions of herbal medicine attached to all cultures that have, either through oral or written records, informed successive generations of their applications. Some modern medicines are based on herbal medicines. Indeed, conventional and herbal medicine were far less distinguishable from each other until sophisticated scientific methodology allowed for analysis and identification of isolated constituents in the 19th Century (Corson & Crews, 2007). The medicinal use of plants has persisted into modern times with pharmaceuticals modelled on the original use of herbs such as *Digitalis purpurea* or *D. lanata* (foxglove) and *Salix* species (willow bark), still used today in the form of digoxin and aspirin respectively (Vickers & Zollman, 1999b).

One of the predominant differences in the application of herbal medicines used by WHs, compared to their use in conventional medical practice, is that WHs use whole plant parts. Plant extracts are usually used in combination, blended into an individualised formulation, rather than using a single isolated active plant constituent given as a standardised dose, in the treatment of particular health problems to people with a given diagnostic label. Also, the blended herbal mixtures reflect a WH's assessment of their client's health needs, treating both physical and emotional factors that may underpin their health issue (Vickers & Zollman, 1999b) rather than the usual pharmaceutical method of modifying a single biochemical process. Whilst conventional

medicine dominates worldwide, there are varying levels of acceptance of traditional herbal medicines within modern healthcare systems, depending on both cultural and economic factors (Burton et al., 2015). The WHO has advocated for the adoption of traditional medicine, including herbal medicines, and their integration into healthcare systems, albeit with the recommendation to increase research into both their safety and efficacy and with a requisite level of regulation over their use (WHO, 2013).

WHM has endured as a complementary therapy according to many surveys conducted into CAM use (Ducrest et al., 2017; Klein et al., 2015; Thomas, K. J. et al., 2001; Wiles & Rosenberg, 2001; Zollman & Vickers, 1999b). Whilst WHM is not always amongst the most widely adopted CAM its use has grown in recent times compared to that of other CAM modalities (Klein et al., 2015; MacLennan et al., 2006). WHM use was around 20% in the general population of the UK in 1998 (Thomas, K. J. et al., 2001), 16.3% in Australia nationally in 2005 (Xue et al., 2007) and 18.6% in the USA in 2012 (Johnson, P. J., Jou, J., et al., 2016). Women, as is the case for all CAM, are higher users of WHM than men (Xue et al., 2007). In South Australia, 24.9% of women compared to 16.1% of men reported using WHM in the previous year (MacLennan et al., 2006). Over 80% of women of reproductive age surveyed in 1996 -1997 in the Study of Women's Health Across the Nation (SWAN) had used at least one herbal medicine in the previous year (Green, R. R. et al., 2017). Of particular relevance is that menstrual problems have featured in women's use of herbal medicines (Abdul-Razzak et al., 2010; Adegbesan-Omilabu et al., 2014b; Cheng, 2011a; Cheng & Lin, 2011; Chia, Lai, Cheung, Kwong, Lau, & Leung, 2013; Domoney et al., 2003a; Eladawi et al., 2014; Hamaideh et al., 2014; Lee, D. Y. et al., 2010; MacLennan et al., 2006; Missmer & Bove, 2011; Pan et al., 2014; Seven et al., 2014; Sternfeld et al., 2002; Tanaka et al., 2014; Tariq et al., 2009; Yazbek, Tezoto, Cassas, & Rodrigues, 2016).

Motivations for the adoption of herbal medicines are likely to include the perception they are safer than prescription medicines; that they tend to be recommended by family members or friends; and that although country-dependent some, at least, can be acquired relatively easily and cheaply making them an attractive option for women

on a lower income and, in the USA, for those who have poor health insurance cover (Bensoussan, A., Myers, S., Wu, S., & O'Connor, K., 2004b; Green, R. R. et al., 2017). In Europe, women with higher educational status and income were identified as higher consumers of WHM (Leach, M..J. et al., 2017). Given that only around 55% of WHM users surveyed in the USA were using them based on their scientific evidence, (Bardia, Nisly, Zimmerman, Gryzlak, & Wallace, 2007) the rationale for the self-prescription of WHMs by a significant proportion of users raises questions of both safety and relevance. To more accurately assess if WHM has a place in treating CPPD, good quality data showing evidence of efficacy based on an informed application of individual herbs is needed.

WHM does not entirely lack health establishment backing as supportive therapy. Within the healthcare environment, WHM has featured in the UK NICE recommendations (Lorenc, Leach, & Robinson, 2014). In the USA, WHM was nominated by 8.8% of primary care clinicians and 29.3% of obstetric and gynaecological clinicians as a therapy they recommend. Furthermore, 15.5% of these primary care clinicians and 44.0% of those involved with gynaecological care wanted to see WHM made available within their health organisation (Gordon et al., 1998).

However, in contrast to the available research into self-prescription of WHMs (Borah et al., 2013; Cheng & Lin, 2011; Eladawi et al., 2014; Hamaideh et al., 2014; Lee, D. Y. et al., 2010; Ohde et al., 2008), the professional prescription of WHM by WHs appears to be poorly assessed. Cross-sectional studies consistently demonstrate that consultations with WHs are invariably much lower than the overall use of WHM. Data from Australia in 2005 suggests only 29.1% of WHM users had visited a WH practitioner in the previous 12 months (Xue et al., 2007). WH visits rose from 1994, when they represented 0.4% of those surveyed in South Australia, to 1.9% in 2004 (MacLennan et al., 2006). Women's visits (1.5%) were greater than that of men (1%) (MacLennan et al., 2006). Professional guidance on WHM would seem to be occuring at a very low level.

Whether this low uptake of WH practitioner visits is due to economic factors with WHs deemed unaffordable or due to a general lack of available practicing WHs remains to be clarified. Within the European Union, it was estimated that WHs, of which there were 29,000, comprised 18% of the total 160,000 registered non-medically trained CAM providers in 2012 (Von Ammon et al., 2012). WHs were one of the largest groups of non-medical CAM professionals (Von Ammon et al., 2012) in the EU, and in this geographical region at least, the number of available practitioners does not appear to be a limiting factor. In the UK in 1998, the 0.9% prevalence of visits to WHs was estimated to amount to 1.45 million consults a year costing £31.03 million in out-of-pocket expenses, indicating that practitioner visits were likely to be economically problematic in that country as medical visits are available free of charge (Thomas, K. J. et al., 2001). Local factors may, therefore, be a significant factor in the prevalence of WH consultations.

In 2004, the professional WH workforce in Australia was estimated at 489 practitioners (Bensoussan et al., 2004b) and in 2014 there were 867 WHM members belonging to the main professional herbalist association (Leach, M. J. et al., 2014). There are problems inherent in mapping the size of this practitioner group. One reason is there are likely to be practitioners in other modalities, such as naturopaths, who use WHM but who belong to a different modality's organisation than WH. Another is that there are practitioners who have decided for whatever reason to remain outside of professional organisations (Bensoussan et al., 2004b). Around a fifth of the WH workforce in 2014 were based in rural or remote areas of Australia, more than half were working part-time and three-quarters of them had on average of less than five consultations per week (Leach, M. J. et al., 2014). These data indicate that accessibility of WHs is unlikely to be the reason for comparatively low levels of consultations compared to WHM use in Australia. There is, however, an apparent under-utilisation of WHs in practice. As WH practitioner visits require private insurance cover or direct out-of-pocket payments, this is the most likely cause of low practitioner visits recorded. Never-the-less, between 2004 and 2005 the annual estimated number of consultations with a naturopath/herbalist was 1.9 - 2.8 million nationally (Bensoussan

et al., 2004b; Xue et al., 2007). This number compared to general medical practitioner visits over the same period of 98.2 million (Britt et al., 2014). Bensoussan et al. concluded that WHs and naturopaths were making a significant contribution to healthcare in Australia (Bensoussan et al., 2004b).

Obtaining at first hand the WHs professional perspective on treating CPPD issues adds an important dimension to the understanding of the potential contribution this group of CAM practitioners could make to extending women's treatment options.

6.3 Western herbal medicine consultations for common menstrual problems; practitioner experiences and perceptions of treatment.

The findings of this study have been published as follows:

Fisher C, Adams J, Frawley J, Hickman L, Sibbritt D. (2017) Western herbal medicine consultations for common menstrual problems; practitioner experiences and perceptions of treatment. *Phytotherapy Research.* 32(3):531-541.

A copy of this manuscript appears in Appendix 5.

6.3.1 Introduction

On average women experience monthly menstrual cycles for around four decades of their lives, typically only interrupted by pregnancies, lactation practices, mental and/or physical health problems (Rowland et al., 2002). Whilst menstrual cycles can vary in length and bleeding duration, the majority of women (between 80 - 97%) will in addition experience problematic symptoms, associated with menstruation at some point within these years (Milewicz & Jedrzejuk, 2006) . Premenstrual syndrome (PMS) and dysmenorrhoea are the most commonly reported conditions, with prevalence rates of around 50% (Direkvand-Moghadam et al., 2014; Taylor, 2005) and up to 91% (Ju, Hong et al., 2014) respectively, but heavy and/or irregular menstruation are also frequently experienced (Milewicz & Jedrzejuk, 2006).

PMS is a set of symptoms occurring any time post-ovulation and prior to menstruation which resolves at the start of bleeding or some days after its onset. The symptoms may be physical, mental, behavioural, emotional or combinations of any number of these (Taylor, 2005). Irregular menstrual periods vary from the normal regular cycle where bleeding occurs every 21 to 35 days and/or are associated with altered bleeding patterns such as inter-menstrual bleeding or prolonged bleeding (Dovom et al., 2016). Heavy periods have been defined as the loss of more than 80 ml of menstrual blood per cycle which left unchecked results in iron deficiency with its widespread, concomitant health consequences (Fraser et al., 2015). Without being able to quantify blood loss, an alternative definition of heavy menstrual bleeding relates to excessive menstrual blood loss that interferes with aspects of women's normal daily function and quality of life (Munro, Malcolm G., 2017). Dysmenorrhoea, cramp-like pelvic pain associated with menstruation, occurs just prior to bleeding or for up to three days into bleeding, and can radiate to other parts of the lower pelvic area or upper legs (Stewart, K. & Deb, 2016). Due to CPPD there are days in the cycle when women's lives are impacted through mood disturbances, reduced resilience to stress and lack of ability to perform or concentrate on normal daily tasks affecting family, social and professional life (Sharp et al., 2002). These functional losses have a further economic cost to women, through extra out-of-pocket medical and self-treatment expenses and lost work-days (Heinemann et al., 2012), and to the state from reduced levels of productivity (Fraser et al., 2009) and increased healthcare costs. For example 0.4% of Danish health expenditure went on treating heavy menstrual bleeding alone in 2005 (Fraser, Langham et al. 2009).

Individual menstrual symptoms, which have been numbered at over 200 (Taylor, 2005), have largely been examined in isolation and initiatives within the field of gynaecology have sought to bring these under the single umbrella term of Cyclic Perimenstrual Pain and Discomfort (CPPD) (Sharp, Taylor et al. 2002). The widespread nature and variable frequency of perimenstrual symptoms, has led many women to seek multiple solutions. These have included using conventional medicine such as

pharmaceuticals, surgery and psychological counselling which can have limitations in terms of efficacy (Fraser et al., 2015; Kaunitz et al., 2008), risks of adverse events (Marjoribanks, J. et al., 2015) and implications for future fertility or conception (Munro, Malcolm G., 2017; Sharp et al., 2002); self-help therapies such as heat packs, analgesics and dietary supplements (Sharp et al., 2002); and treatment offered beyond conventional medicine such as acupuncture and massage therapy (Fisher, C., Sibbritt, Hickman, & Adams, 2016). These options may be used on their own by women at different times or concurrently as complementary therapy. There was a noted fall in medical prescription rates for PMS in the UK between 1993-1998 (Wyatt et al., 2002), a decline which continued till 2013 (Sammon et al., 2016). Data from North America, France and Germany also support reduced rates of PMS diagnosis from 2004-2006 indicative of lower consultation rates by women and at odds with reported PMS prevalence (Weisz & Knaapen, 2009). These findings may be illustrative of a move by women to find alternative, non-pharmaceutical solutions.

Complementary and alternative medicine (CAM) includes a range of diverse health-related strategies that can be described as predominantly operating outside the conventional medical curriculum and medical profession (WHO, 2013). Women are predominant adopters of CAM with prevalence rates amongst Australian women having risen significantly between 1993 and 2004 (MacLennan et al., 2006). Direct evidence of varying quality exists for the efficacy of a variety of CAM in treating menstrual problems including acupuncture, aromatherapy, nutritional supplements and WHM for dysmenorrhoea and PMS (Fugh-Berman & Kronenberg, 2003; Izzo, Hoon-Kim, Radhakrishnan, & Williamson, 2016).

Traditional herbal medicine is considered one of the oldest CAM modalities, with its ethnic diversity reflecting the flora present in specific geographical locations and its practices often enshrined in local pharmacopoeias. Whilst WH practice is largely self-regulated worldwide, governing bodies have been established to oversee the quality of education and define ethical and practice limitations. Treatment strategies are holistic, addressing both the mental and physical aspects of an individual's health. Whole

medicinal plant parts may be used as teas, tablets and/or as alcohol/water extracts – tinctures - which are the predominant form used in modern practice, usually blended into individualised formulations. Official endorsement and promotion of its use has come from the World Health Organization (WHO, 2013). WHM use is increasing worldwide, predominantly amongst women (MacLennan et al., 2006). It has been suggested that women's increased uptake of non-prescription alternatives for PMS coupled with a concomitant rise in visits to WHM clinics, may be possible explanations for the drop-off in UK prescription rates for PMS (Wyatt et al., 2002). Further to this, a survey undertaken around this time reported PMS was one of the main health problems being treated by WHs (Barnes, J. & Ernst, 1998). Additionally, indirect evidence from cross-sectional studies conducted worldwide suggests women are adopting WHM to specifically address commonly experienced menstrual symptoms (Fisher, C., Sibbritt, et al., 2016). Indeed, there is gathering evidence of the beneficial role that WHMs may have in treating aspects of CPPD (Izzo et al., 2016). Clinical trials (Schellenberg, Zimmermann, Drewe, Hoexter, & Zahner, 2012) and a recent review (Izzo et al., 2016) for example suggest chaste tree (*Vitex agnus-castus*) is a potentially beneficial treatment for PMS, a condition for which it is routinely prescribed by German doctors (Schellenberg et al., 2012). There is however a dearth of robust, clinical trials of herbal medicine in treating CPPD with many studies lacking good methodology and associated with risks of bias. Whilst systematic reviews have concluded, that within these limitations, herbal medicines may have significant benefits over placebo and in some cases equivalence with conventional medicine in terms of efficacy, they are largely considered inconclusive due to lack of quality studies (Javan et al., 2016; Verkaik, Kamperman, van Westrhenen, & Schulte, 2016).

Given the health burden and cost to women it is important to examine all health-seeking behaviours with a view to ensuring that women are using oral medicines appropriately and with proper guidance regarding effective dosages and potential interactions if they are used concurrently. The objective of our study was to assess WHs consultations with women for the menstrual-related disorders of PMS, dysmenorrhoea, irregular and heavy periods, with a focus on examining the

prevalence, perceptions, experiences and inter-referral practices of WHs regarding treatment. Our analyses provide the first insights regarding the behaviour and role of this health provider group in the health care of women affected by CPPD in Australia.

6.4 Method

6.4.1 Sample

A subset of practitioners, identifying as WHs, from the Practitioner Research and Collaboration Initiative (PRACI) were surveyed between November 2016 and January 2017. PRACI is an Australian national database of 14 CAM professions whose individual members elected to join what is the largest practice-based complementary healthcare research network worldwide (Steel et al., 2014). There are currently 764 PRACI members representing a 60% uptake of those initially invited to participate after completing the 2015 baseline survey. Participants and non-participants were not significantly different in terms of age, gender, urban/rural location, qualifications but there were some geographical discrepancies. WH participants were more often urban based and are less well spread geographically than the general CAM workforce (Steel et al., 2017). Based on data from the profile of WHs in Australia carried out in 2014 (Leach, M. J. et al., 2014), PRACI WH participants represent a small proportion of those practitioners registered with the main Australian, WHM professional body.

Ethical approval for this survey was granted by the Human Ethics Committee at the University of Technology Sydney (UTS HREC ETH16-0534) (Appendix 6).

PRACI members registered as currently practising as WHs at the time of this survey were invited to participate in this sub-study into their treatment of specific menstrual problems (PMS, dysmenorrhoea, irregular and heavy menstruation), by electronically receiving a new, specifically designed, self-administered, on-line questionnaire. Identity codes used by PRACI ensured anonymity of participant data and access to survey responses were processed only by lead researchers and stored on a private secure, electronic device.

The questionnaire was pilot tested by a sample of experienced herbalists who after completing the survey provided feedback on all aspects of the questionnaire including content, topics enquired into and practical aspects of completing the survey in terms of comprehensibility, provision of responses and time to complete. The questionnaire therefore has face validity. Note that none of the questionnaire items measure skills, knowledge, abilities, personality traits, or judgements. Nor do they measure clinical or personal phenomena of individualised patient care (i.e. psychometric or clinometric factors). The questionnaire received approval by the PRACI steering committee prior to its being sent out.

The survey had a brief explanation that highlighted the background issues of CPPD and its goals before leading into the questionnaire. The questionnaire consisted of 51 questions and encompassed a range of measures of practitioner characteristics and questions specifically related to the treatment of menstrual problems.

6.4.2 Questionnaire format

The questionnaire comprised of five sections, as outlined below. There were no compulsory questions. Practitioners were advised that their participation in the survey was entirely voluntary and that their consent would be implied by their completion of the questionnaire.

6.4.3 Practitioner demographics

Data was gathered on age, gender, practitioners' clinic(s) location and qualifications.

6.4.4 Practice details

Practitioners were asked to indicate if they worked alone or with other practitioners in their clinic(s) and about their clinic in terms of size, including other practitioners and

client numbers, client make-up and duration of consultations.

6.4.5 Treatment of Specific menstrual problems

Questionnaire items explored WHs' diagnostic confidence and methodology, routine enquiry of menstrual history, numbers of affected clients identified as having menstrual issues, treatment approaches, perceived treatment efficacy and instruments used for this assessment, the advantages, disadvantages and potential side-effects of treatment, herbs most frequently prescribed for each problem, average treatment cost and treatment duration, consultation frequency and sources used to access the latest relevant research.

6.4.6 Interaction with other practitioners

Practitioners were asked about their inter-disciplinary formal contact with other health professionals and their cross-referral patterns and attitudes to contact with conventional health practitioners (CHPs). Practitioners were also asked about the importance of scientific research with regards to herbal treatment of CPPD, and the extent to which such research altered their prescribing practices.

6.4.7 Perceived client behaviour

Practitioners' knowledge of clients' behaviour was explored including their clients' previous conventional treatment, concurrent use of WHM with conventional treatment, motivations and reasons for choosing WHM treatment.

6.4.8 Menstrual problems

The menstrual symptoms of PMS, dysmenorrhoea, heavy and irregular periods were

selected for study as these symptoms were considered those that occur commonly, are cyclical and largely idiopathic in nature.

6.4.9 Statistical analyses

Bivariate analyses were carried out using either Fisher's exact test or Wilcoxon rank sum, where appropriate. Statistical significance was at α=0.05. All statistical analyses were conducted using Stata 14.2.

6.5 Results

From the PRACI database, 98 Australian-based WHs were eligible and invited to participate in our study, of these six invitations were returned "undeliverable". The final response of 40 completed surveys represents a response rate of 43.5%.

6.5.1 Professional demographics and practice details

The breakdown of demographic data by gender is shown in Table 6.1. Most respondents were female (73%), urban-based (69%), sole practitioners (60%), with a predominantly female client base (78%), around half of whom were in their reproductive years. The majority of WHs worked from urban locations (73%) and operated from a single clinic (65%). No WHs were the sole CAM practitioners in a conventional medical setting. WHs with degrees or higher qualifications in WHM comprised around 40% of respondents. Comparing this demographic data with that from the much larger study published in 2014 (Leach, M. J. et al., 2014) our participants are representative of the wider WH practitioners in Australia in terms of location (p=0.4702) and age (p=0.0868) but there was a lower proportion of females (p=0.0306). In addition, although our survey appears to identify fewer graduate level or higher qualified practitioners (p<0.001) this is likely to be because information sought in the two questionnaires are not directly comparable, our questionnaire

sought the respondents' highest qualification in herbal medicine whereas the NHAA study enquired into the highest educational qualification.

6.5.2 Treatment of menstrual problems

WHs reported the monthly average number of women who specifically sought treatment for menstrual issues was 15 (median=6) and the average weekly estimate of the number of women who the WHs believed were suffering with menstrual problems was 4.7 (median=5). The approach to WHM prescription for women with menstrual issues varied amongst the WHs. Up to 40% of the WHs included a prescription for a single herb (median=10%) and between 2% - 90% (median= 35%) employed pre-formulated, proprietary products as part of their treatment, but no WHs relied on either of these forms of herbal product by themselves to treat women's menstrual issues. Most WHs (median=70%) included a prescription for a combination of herbs, tailored to the woman's needs, whilst 20% used individualised formulas exclusively. However, the majority of WHs (42%) employed a combination of all three types of herbal formulations in their treatment of women with menstrual problems. The average estimated weekly cost to clients for herbal medicine prescriptions to treat menstrual complaints ranged from $5.00 to $75.00 (median=$25.00) with a median treatment duration of between 4 to 6 months (data not shown).

The characteristics of WHs relating to evaluation of their training and confidence in treating menstrual symptoms are presented in Table 6.2. Comprehensiveness of professional training and diagnostic confidence in the four named menstrual symptoms were rated positively by most respondents. However, WHs with diplomas or advanced diplomas were significantly more confident in diagnosing irregular periods ($p=0.026$), heavy periods ($p = 0.009$) and dysmenorrhoea ($p = 0.034$) than those WHs whose qualifications were at degree or higher level.

Table 6.3 shows the characteristics of WHs practice and assessment of treatment for menstrual problems. Treatment efficacy was rated highest for PMS, where it was

Table 6.1: Demographics of Western herbalists by gender

Demographic	Practitioners			NHAA Survey(Leach, M. J. et al., 2014)	
Gender (n=40)	**Female** 29 (73%)	**Male** 11 (27%)	**Total**	**Female 346 (86.7%)**	**Male 53(13.3)**
Age in years (n=36)					
40 years of younger			6 (16.7%)	126 (31.6%)	
40 years or older			30 (83.3%)	273 (68.4%)	
Mean	50.6 (SD=9.06)	53.3 (SD=9.94)	51.4 (SD=9.25)		
Clinic description (n=40)	19 (65.5%)	7 (63.6%)	26 (65.0%)	N/A	
One					
More than one	10 (34.5%)	4 (36.4%)	14 (35.0%)		
Clinic location (n=40)					
Urban	20 (69.0%)	9 (81.8%)	29 (72.5%)	188 (63.3%)	
	10 (34.5%)	4 (36.4%)	14 (35.0%)	109 (36.7%)	
Rural					
Remote	0 (0.0%)	0 (0.0%)	0 (0.0%)		
Qualifications (n=40)					
None (grandfathered)	0 (0.0%)	1 (9.0%)	1 (2.5%)	3 (0.01%)	
Diploma	4 (14.0%)	0 (0.0%)	4 (10.0%)	110 (27.6%)*	
Advanced diploma	15 (52.0%)	4 (36.0%)	19 (47.5%)	-	
Batchelor degree	7 (24.0%)	0 (0.0%)	7 (17.5%)	148 (37.1%)	
Postgraduate degree	3 (10.0%)	6 (55.0%)	9 (22.5%)	138 (34.6%)	
Years since this Qualification (n=39)					
1 – 5 years	8 (28.0%)	1 (10.0%)	9 (22.5%)	N/A	
6 – 10 years	8 (28.0%)	5 (50.0%)	13 (32.5%)		
11 – 15 years	4 (14.0%)	4 (40.0%)	8 (20.0%)		
16 years or more	9 (30.0%)	0 (0.0%)	9 (22.5%)		
Clinic setting					
Sole practitioner	18 (62.0%)	6 (55.0%)	24 (60.0%)		
Sole CAM practitioner in conventional practice	0 (0.0%)	0 (0.0%)	0 (0.0%)	N/A	
Multimodality clinic with conventional	7 (24.0%)	3 (27.0%)	10 (25.0%)		
Multimodality clinic with other CAM	4 (13.0%)	3 (27.0%)	7 (17.5%)		
No. of other practitioners if not sole practitioner	1 -17 (median=4)	1 -15 (median=6)	1 -17 (median=4.5)		
Skype consultations (n=39)					
Yes	16 (57.0%)	6 (55.0%)	22 (56.4%)	N/A	
No	12 (43.0%)	5 (45.0%)	17 (43.6%)		
Number of clients per week (n=40)					
0 – 5	4 (14.0%)	1 (9.0%)	5 (12.5%)		
6 – 10	8 (28.0%)	4 (36.0%)	12 (30.0%)	N/A	
11 – 20	10 (34.0%)	3 (27.0%)	13 (32.5%)		
21 – 40	6 (21.0%)	2 (18.0%)	8 (20.0%)		
More than 40	1 (3.0%)	1 (9.0%)	2 (5.0%)		
Women clients (%) (n=39)	50 – 90 (mean=79%)	60 – 90 (mean=76%)	50-90 (78%)	N/A	
Women of menstruating age (%) n=40)	20 – 90 (mean=55%)	15 – 90 (mean=53%)	15-90 (54%)	N/A	

* The NHAA survey combined diploma and advanced diploma and does not specify the qualification relates to herbal medicine.

Table 6.1 continued

Demographic	Practitioners			NHAA Survey(Leach, M. J. et al., 2014)	
Gender (n=40)	**Female** 29 (73%)	**Male** 11 (27%)	**Total**	**Female 346 (86.7%)**	**Male 53(13.3)**
Initial consultation (minutes) (n=40)	40 – 120 (median=75)	60 – 90 (median=60)	40 - 120 (median=72)	15 (5.2%)	
<45	2 (6.9%)	0 (0.0%)	2 (5.0%)	121 (41.6%)	
46-60	12 (41.4%)	8 (72.7%)	20 (50%)	93 (32.1%)	
61-75	2 (6.9%)	1 (9.0%)	3 (7.5%)	46 (15.9%)	
76-90	11 (37.9%)	2 (18.1%)	13 (32.5%)	15 (5.2%)	
>90	2 (6.9%)	0 (0.0%)	2 (5.0%)		
Follow up consultation (minutes)(n=40)	20 – 60 (median=45)	30 – 60 (median=30)	20 - 60 (median=43)	4 (1.4%)	
<15	0 (0.0%)	0 (0.0%)	0 (0.0%)	98 (33.8%)	
16-30	11 (37.9%)	6 (54.5%)	17 (42.5%)	110 (37.9%	
31-45	7 (24.1%)	2 (18.1%)	9 (22.5%)	69 (23.8%)	
46-60	11 (37.9%)	3 (27.2%)	14 (35.0%)	9 (3.1%)	
>60	0 (0.0%)	0 (0.0%)	0 (0.0%)		

deemed 'always effective' by 84% of WHs; with 81%, 71% and 61% rating treatment as 'always effective' for dysmenorrhoea, irregular periods and heavy periods respectively. The 'always effective' rating compared across symptoms was statistically significantly different between PMS and heavy periods only (p = 0.010). In terms of diagnostic methods used respondents use of standard diagnostic tests (p=0.6574), Diagnostic and Statistical Manual of Mental Disorders (DSM) or other validated questionnaires (p=0.7832), charts (p=0.3878) and client history taking (p=0.5656) were no different across the menstrual problem concerned. There was also no difference in the distribution of frequency of efficacy of herbal treatments across the menstrual problems (p=0.2992) or in the respondents' believed benefits of their use of herbal medicine for treating the different menstrual problems (p=0.9999).

Whilst nearly all WHs relied on clients' self-evaluation to assess treatment efficacy, questionnaires were used by 27% and laboratory testing by 40% as additional aids. Those WHs who used established tools to diagnose any of the menstrual conditions were also more likely to use laboratory testing and/or questionnaires to evaluate treatment efficacy (p = 0.045). However, whilst this associated likely use of tools to assist in diagnosis and evaluation is true also for the individual problems of PMS (p = 0.017), heavy periods (p = 0.005) and dysmenorrhoea (p = 0.027), the likelihood does not hold for respondents in relation to irregular periods (p = 0.164) (data not shown).

Table 6.2: WHs characteristics regarding treatment of menstrual problems

	PMS				Irregular periods				Heavy periods				Dysmenorrhoea			
	Highest qualification in Herbal Medicine				Highest qualification in Herbal Medicine				Highest qualification in Herbal Medicine				Highest qualification in Herbal Medicine			
	Total n (%)	Diploma	Degree	p-value	Total n (%)	Diploma	Degree	p-value	Total n (%)	Diploma	Degree	p-value	Total n (%)	Diploma	Degree	p-value
Comprehensive training (n=31)																
Very	14 (45)	10	4	0.159	15 (48)	11	4	0.149	16	12	4	0.073	15 (48)	11	4	0.149
Somewhat	16 (51)	7	9		15 (48)	6	9		(51)	4	8		14 (45)	5	9	
Other	1(4)	1	0		1 (4)	1	0		12 (39)	2	1		2 (7)	2	0	
									3 (10)							
Confidence to diagnose (n=30)																
Very	23 (77)	16	7	0.084	24 (80)	17	7	0.026	23	17	6	0.009	23 (77)	16	6	0.034
Somewhat	7 (23)	2	5		6 (20)	1	5		(77)	1	6		7 (23)	2	6	
Other	0 (0)	0	0		0 (0)	0	0		7 (23)	0	0		0 (0)	0	0	
									0 (0)							

Note:
Diploma = Diploma or Advanced diploma.
Degree = Degree or Postgraduate degree.

Table 6.4 lists the herbs most often prescribed by WHs for each menstrual symptom. Whilst a small number of herbs such as *Vitex agnus-castus*, *Paeonia lactiflora*, *Actaea racemosa* and *Angelica sinensis* were reported as those most often prescribed by WHs to cover the treatment of all four symptoms, other herbs that were commonly prescribed were specific to the prevailing symptom.

Side-effects of herbal medicines were cited by 10% of WHs as one of the drawbacks to their treatment. For all side-effects enquired into WHs perceptions were that these were largely 'never' or 'rarely' reported back to them by their clients being treated for menstrual problems. However, of those side-effects that were 'sometimes' reported to them by these same women 23% indicated this to be for nausea, 19% for diarrhoea, 10% for bloating, 6% for headaches and 3% for insomnia. Respondents were invited to add reports of other side-effects not listed resulting in a further five instances, which were skin rash (1), initial worsening of symptoms (2), upset stomach (1) and vomiting (1). The frequency of these events was not specified by respondents.

6.5.3 Interaction with other health practitioners regarding treatment of patients with menstrual problems

Frequency of formal contact to other CAM health practitioners and CHPs, as reported by participants, was 48% and 35% respectively. Contact initiated by CHPs to WHs (19%) was reported to be less frequent than contacts to WHs from other CAM therapists (45%). WHs who indicated they received more frequent levels of contact ('sometimes / often') initiated by CHPs were also more likely than those indicating that this contact occurred 'rarely / never' to have a practice with an average of 21 or more clients per week ($p = 0.043$). This association between practises of 21 or more was not significantly related to frequent contact from other CAM practitioners ($p = 0.233$) or where frequency of contact from WHs was to CAM practitioners ($p = 0.252$) or to conventional practitioners ($p = 0.217$) (data not shown). When asked which health practitioners were known to have recommended their services, or that of any WH, to treat menstrual symptoms 68% of WHs reported other CAM practitioners as the main

Table 6.3: Characteristics of WHs practice and assessment of treatment for menstrual problems

	PMS	Irregular	Heavy	Dysmenorrhoea	p-value
Diagnosis methods used (n=31)					
Standard test	7 (23%)	11 (36%)	11 (36%)	10 (32%)	0.6575
DSM/questionnaire	11 (36%)	8 (26%)	8 (26%)	8 (26%)	0.7832
Charts	11 (36%)	14 (45%)	9 (29%)	8 (26%)	0.3879
Case history	31 (100%)	30 (97%)	31 (100%)	30 (97%)	0.5656
Efficacy of herbal treatment (n=31)					
Always	26 (84%)	22 (71%)	19(61%)	25 (81%)	0.2992
Sometimes	5 (16%)	9 (29%)	11 (36%)	6 (19%)	
Never/rarely	0 (0%)	0 (0%)	1 (3%)	0 (0%)	
Benefits of treatment (n=31)					
Very effective	28 (90%)	22 (71%)	23 (74%)	27 (87%)	0.9999
Few side effects	22 (71%)	22 (71%)	22 (71%)	24 (77%)	
Holistic way to better health	23 (74%)	23 (74%)	21 (68%)	24 (77%)	
Better long-term outcomes	22 (71%)	20 (65%)	19 (61%)	22 (71%)	
Other	2 (6%)	4 (13%)	3 (10%)	2 (6%)	

Table 6.4: Herbs most often prescribed by WHs to treat specific menstrual symptoms

Herbs used	Botanical Name	Premenstrual Syndrome		Irregular periods		Heavy periods		Dysmenorrhoea	
		Frequency	%	Frequency	%	Frequency	%	Frequency	%
Chaste tree	*Vitex agnus-castus*	21	80.8	22	84.6	11	42.3	8	30.8
Peony	*Paeonia lactiflora*	7	26.9	10	38.5	3	11.5	8	30.8
Crampbark	*Viburnum opulus*	3	11.5					16	61.5
Bupleurum	*Bupleurum falcatum*	4	15.4						
Shatavari	*Asparagus racemosa*	2	7.7	6	23.1			2	7.7
Passionflower	*Passiflora incarnata*	3	11.5						
Black cohosh	*Actaea racemosa*	5	19.2	5	19.2	3	11.5	4	15.4
Dong quai	*Angelica sinensis*	6	23.1	5	19.2	4	15.4	10	38.5
Indian ginseng	*Withania somnifera*	6	23.1	3					
St John's wort	*Hypericum perforatum*	7	26.9						
Chinese foxglove	*Rehmannia glutinosa*	3	11.5	2	7.7				
Magnolia berry	*Schizandra sinensis*	2	7.7						
Skullcap	*Scutellaria lateriflora*	2	7.7						
False unicorn root	*Chamaelirium luteum*			3	11.5				
Liquorice	*Glycyrrhiza glabra*			6	23.1				
True unicorn root	*Aletris farinosa*			2	7.7				
Lady's mantle	*Alchemilla vulgaris*					11	42.3	2	7.7
Shepherds purse	*Capsella bursa-pastoris*					11	42.3		
Beth root	*Trillium pendulum*					4	15.4		
Yarrow	*Achillea millefolium*					4	15.4		
Black haw	*Viburnum prunifolium*							2	7.7
Tienchi	*Panax notoginseng*					4	15.4		
Raspberry leaf	*Rubus idaeus*					2	7.7		
Golden seal	*Hydrastis canadensis*					2	7.7		
Wild yam	*Dioscorea villosa*							8	30.8
Turmeric	*Curcuma longa*							3	11.5
Blue cohosh	*Caulophyllum thalictroides*							2	7.7
Ginger	*Zingiber officinale*							4	15.4
Corydalis	*Corydalis ambigua*							3	11.5
Pukatea	*Laurelia novae-zelandiae*							2	7.7

(Frequency = number of times the herb was mentioned for each condition. % respondents = practitioners who selected the herb as a percentage of those responding to this section)

source, while 45% recorded recommendations coming from general practitioners and 26% that medical specialists had made the recommendation.

Referral patterns of clients by WHs to other practitioners were predominantly to general practitioners (57%), followed by other CAM professionals (40%) and counsellors (23%) with 20% making referrals to women's clinics (20%). The majority of WHs (74%) indicated they were comfortable in communicating with their clients' CHPs, and 71% that such collaboration was desirable. Nearly all WHs (97%) reported always or sometimes encouraging their clients to disclose their WHM use to their conventional medical practitioner.

Most WHs (94%) reported enquiring with their clients about whether the client had already consulted a medical practitioner for their presenting menstrual problem(s) and of these, the percentage of clients estimated to have received conventional medicine prior to approaching the WH varied widely (mean=64%, median=70%). WHs practising in urban settings were more likely than those practising in rural settings to respond that over half of their clients had received conventional medical treatment for their menstrual problems before the clients consulted with them ($p = 0.001$) (data not shown).

6.6 Discussion

This paper reports findings from the first survey to examine WHM consultations for the treatment of common menstrual problems as well as their expectations of treatment duration, costs, actual herb choices, diagnostic assessments, perceptions of the benefits and adverse events of WHM and inter-referral practises. Some interesting points arise from our analyses and are discussed below.

According to responding WHs an average of 15 women per month per practitioner specifically sought help for menstrual problems. In addition, WHs also estimated they

identified, on average, around 20 women per month (five women per week) in their consultations who they believed suffered menstrual problems. It is therefore possible an additional number of affected women are being identified during consultation whose primary reason for seeking the services of a WH is not around menstrual issues. Also from this data it is likely that WHs are regularly treating these prevalent menstrual problems. A survey of UK WHs in 1997 identified PMS as one of the leading conditions treated (Barnes, J. & Ernst, 1998) and another in 2010 indicated that women made up on average 67% of WHs' client base and of these 59% were seeking help to treat women's issues (Nissen, 2010).

Between 2004 and 2006, based on reliable health care data derived from five different countries, the actual diagnosis of PMS and its more severe form, Premenstrual Dysphoric Disorder (PMDD), made annually by conventional medical practitioners represented less than 0.1% of all women's consultations irrespective of nationality (Weisz & Knaapen, 2009). PMS itself has a prevalence of around 50% (Taylor, 2005) and that of PMDD is estimated at between 3% - 9% (Kaunitz et al., 2008; Milewicz & Jedrzejuk, 2006). In spite of the fact that some women included in the Weisz and Knaapen calculation would have fallen outside the relevant age range for menstruation the finding still suggests conventional consultation rates are very low. In 1998 the rate of prescription-linked diagnosis of PMS in the West Midlands of the UK was estimated at 0.42% of all women in the area, this was lower than the same data collected in 1993 (Wyatt et al., 2002). Furthermore according to a 2014 Australian survey of a large GP population that claims to provide the 'most comprehensive and objective' measure of GP activity worldwide, the mean duration of consultations reported was 14.4 minutes and almost 60% of these consultations dealt with a single health problem (Britt et al., 2014). The relatively short consultations, no doubt inherent in busy conventional medical settings, are likely to preclude questioning into women's menstrual histories if this is not the presenting issue. By contrast, the relatively long consultations and routine questioning around menstruation, as reported in our survey of WHs, improve the likelihood of exposing undiagnosed or untreated menstrual problems. Based on

data provided by WHs in our survey a relatively higher proportion of women they treat may be receiving WHM for their menstrual disorders than the proportion being treated by conventional medical practitioners. These factors may have significance for the possible efficacy of and/or preference by women to treat menstrual problems with WHM and further research is warranted to arrive at a better understanding of the import of these data.

As perceived by practitioners, WHM appears associated with few, relatively minor side effects regarding menstrual problem treatment. This view is currently supported for some herbs by independent assessment (Izzo et al., 2016). However, this is a field still requiring greater corroboration. Comparisons of conventional medicine rates for effective treatment of all four menstrual issues have been reported as variable across reviews (Marjoribanks, Jane et al., 2016; Sharp et al., 2002; Yonkers et al., 2008) and/or to be subject to significant risk of side effects (Kaunitz et al., 2008; Marjoribanks, J. et al., 2015; Taylor, 2005) and in the case of hormone therapies such as oral contraceptives and GnRH (gonadotrophin-releasing hormone) agonists (Yonkers et al., 2008), and surgery (hysterectomy or oophorectomy) (Yonkers et al., 2008) carry the significant drawback of being unsuitable for women contemplating pregnancy. Not only have health service managers acknowledged that CAM practitioners can bridge gaps in their service and improve holistic care and choices for clients (Singer & Adams, 2014) but some general and specialist CHPs have endorsed having CAM options available for treating gynaecological issues (Münstedt et al., 2014). Scope may therefore exist for increased treatment options for women but further investigation involving suitable clinical trials of WHM would be a pre-requisite.

Our analyses do suggest that referrals between conventional medical practitioners and WHs are already occurring, although perceived warning signs/reasons for referral were not part of this survey and should be examined in more detail in the future to assess the safety of WH practice. A 2013 Australian survey of an organisation representing a range of natural health practitioners recorded only 2% of their respondents worked in

clinics which included conventional medical practitioners (Grace, Rogers, & Eddey, 2013) much lower than the 25% recorded in our survey. One possible interpretation of our finding is that herbalists may be more frequent participants in multidisciplinary clinics which include conventional medical practitioners than CAM practitioners from other modalities. Another is that the level of WHs integration into this type of clinic may have risen significantly, supported by data from a 2004 naturopath/herbalists survey where 7% identified as working in this type of multidisciplinary environment (Bensoussan et al., 2004b). Increased integration of WHs into multidisciplinary clinics in either case may indicate that conventional medical practitioners have increasingly found WHs of benefit to their healthcare provision. Further research is needed to clarify this situation.

The uncertain and multi-factorial aetiology of menstrual symptoms has led to over 300 therapies being prescribed as part of conventional medical treatment (Milewicz & Jedrzejuk). These include the use of a variety of pharmaceuticals such as anti-depressants and hormone therapy (oral and/or implants), alongside symptom-specific treatments such as analgesics, diuretics and/or anti-fibrinolytics and possibly also psychological, dietary and lifestyle support and/or surgery (Kaunitz et al., 2008; Sharp et al., 2002; Taylor, 2005). In addition, treatment choices can be further complicated as women often experience several perimenstrual issues concurrently. This has prompted gynaecology specialists to recommend the adoption of individualised strategies in conventional treatment of women with CPPD. Individualised treatment is highlighted in this survey by WHs predominantly using herbal blends. Such blends allow for a range of menstrual symptoms to be addressed within a single formulation. Furthermore, WHM has a long tradition contained in historical Pharmacopoeias attesting to the use of herbs to enhance women's reproductive health. However, in scientifically assessing individualised treatment, whether conventional or WHM, new and different research methodology centred on overall 'wellness' is required, such as that espoused by Whole Systems Research (Verhoef et al., 2005). This research approach was developed in response to the sophisticated technological advances enabled by gene mapping and

focuses on the more complex outcome of "maximizing patients' capacity to achieve mental and physical balance", as the endpoint measure of a treatment's efficacy (Verhoef et al., 2005). Such a patient-based approach would regard the whole package of care, from all sources, as the intervention to be assessed and would provide an appropriate model with which to evaluate individualised treatment strategies. The field of integrative health is increasingly becoming a research interest as patients' preferences assume primary consideration (Liu et al., 2007).

As the standard current conventional treatments normally employed may not resolve the range of symptoms equally effectively, women with CPPD are often prescribed a variety of strategies and/or pharmaceuticals (Kaunitz et al., 2008; Yonkers et al., 2008), involving multiple health professionals (Marjoribanks, Jane et al., 2016). Up to 30% of women with heavy menstrual bleeding are estimated to seek medical help during their reproductive lives (Laberge et al., 2015). The current recommended first line treatments are endometrial ablation or hormone implant devices. However, of the women treated using these therapies up to 20% (Hussain et al., 2016) and 60% (Marjoribanks, Jane et al., 2016) respectively have been found to go on to receive hysterectomies. Both implants and surgery require costly, high-level medical care. Idiopathic menstrual problems have a high prevalence and can require long-term treatment (Kaunitz et al., 2008; Yonkers et al., 2008), their direct and indirect costs are undoubtedly significant (Liu et al., 2007). In addition to medical costs, women pay an extra price through their reduced participation in work/school and social life, morbidity and disability (Liu et al., 2007; Sharp et al., 2002). Prescribing practices across four nations highlighted that when women choose to consult CHPs for PMS, 72% - 89% received prescriptions, as compared to 59% - 78% for all women patients whose consultations result in a prescription . Heavy menstrual bleeding alone is estimated to account for over 5% of 30 - 49 year-old UK women consulting their doctors each year and a further 12% of gynaecology referrals (Grant et al., 2000). Within conventional costs for the initial treatment of menstrual problems there are potential additional expenses from unintended side-effects. For example, to the

already considerable expense generated by high hysterectomy levels secondary costs can arise from associated surgical complications, some of which may have very serious health consequences (Marjoribanks, Jane et al., 2016; Spilsbury et al., 2009). Western Australia hospital records from 2000-3 recorded re-admission rates of 7.2%, following hysterectomies, due to complications (Spilsbury, Semmens et al. 2009). From the data gathered in our survey we have projected the costs reported by WHs for WHM treatment, taking average duration (4-6 months) and average, weekly cost per client this computes to between AUD $453 - AUD $680, excluding practitioner fees. As the Australian governmental health insurance, Medicare, covers Australian residents for conventional healthcare whilst both public and private provision for WH consultations is much more limited, for some women this cost may not be insubstantial. However, for health providers responsible for covering such costs, these figures appear to be very modest if WHM treatment should prove to be viable and effective in the long-term. Comparable data to that estimated above for WHM for conventional treatment would be near impossible to determine particularly when addressing multiple symptoms simultaneously but our data suggests that relative costs associated with WH treatment compared to current conventional costs could provide a beneficial cost-to-benefit ratio. This important topic deserves further investigation to establish both the overall cost of treatment of these wide-spread menstrual problems to achieve short term symptom-resolution as well as the associated medium and long-term outcomes.

There are limitations to our study not least of which is the low response rate although this rate is similar to previous surveys of CAM therapists which have reported response rates of around 35% (Leach, M. J. et al., 2014). Our sample size is small and limited to English-speaking practitioners and as such may not fully represent the geographical spread of WHs throughout Australia. Larger studies are needed to corroborate our findings. In terms of the demographic profile and clinic details of participating WH practitioners our data is broadly in line with similar surveys using larger Australian samples (Grace et al., 2013; Leach, M. J. et al., 2014) with the possible exceptions that our sample has under-represented females and over-represented older practitioners

when comparing these specific demographics to one previous WH survey (Leach, M. J. et al., 2014). Selection bias is possible given the voluntary nature both of membership to the PRACI database and those practitioners completing our sub-study questionnaire possibly limiting the generalizability of the findings. Respondents were not asked specifically about identifying serious risks associated with menstrual issues that would require referral for detailed medical investigation, a limitation associated with the questionnaire itself. Finally, the information obtained from our survey is self-reported and so may be subject to recall and confirmation bias. However, these limitations are countered by the information obtained from our study providing the first examination of WHs' treatment of patients with menstrual problems.

6.7 Conclusion

Based on the perceptions of WHs in our survey, WHM could represent a potentially viable option in the treatment of common menstrual problems if its lack of serious side-effects and efficacy can be corroborated by robust, independent research. WHM may offer a much-needed extension to individually tailored treatments currently available.

6.8 Chapter summary

This chapter has added an important new perspective on the potential of WHM to be considered as a treatment option in the prevalent problems associated with CPPD, based on the informed application of these medicines by qualified WH practitioners. The results of this study provide an encouraging basis from which to further pursue a thorough investigation of the contribution that WHM may offer to an area of healthcare where new therapeutic initiatives are much needed by both women and those caring for them. WHs expressed a high level of confidence in the safe and effective treatment of WHM in addressing common menstrual problems.

The following chapter will extend the enquiry into WHM and its contribution to the treatment of CPPD through a search of the literature for clinical and scientific support for the main herbs identified from this study of WHs as those applicable to the resolution of four main menstrual issues.

7. Is there a role for Western herbal medicine in treating cyclic perimenstrual pain and discomfort?

7.1 Chapter introduction

Previous chapters have established the high prevalence of CPPD issues and the fact that women mostly self-treat using a variety of CAM and to a lesser degree by seeking the support of CAM practitioners. WHs are amongst the CAM workforce who are providing this support and as the previous chapter has determined, the WHs themselves perceive their treatment with WHM to be not only effective but also safe, with only minor side-effects reported by their CPPD clients.

A core group of four herbs was nominated by PRACI WHs, in Chapter 6, as those utilised to treat the main CPPD issues of premenstrual syndrome, irregular periods, heavy periods and dysmenorrhoea. Between 31% - 85% of WHs named *Vitex agnus-castus*, 12% - 39% *Paeonia lactiflora*, 12% - 19% *Actaea racemosa* and 15% - 39% *Angelica sinensis* as those herbs they would most often prescribe for treating the four menstrual issues. Whilst two of the four herbs are traditionally used in WHM, the other two, *Paeonia* and *Angelica*, being relative newcomers to WHM, have been adopted from the traditional Chinese medicine (TCM). This chapter examines the clinical evidence attached to each of these particular herbs that would contribute to the validation of WHs choice of them for treating CPPD.

7.2 Background

Much of the applied use of WHM by WHs relies on traditions empirically acquired and handed down across generations of 'healers' through ancient, historical texts written by the great physicians of their time. The earliest written records were found in Mesopotamia and date back to 2400 BC (David, Wolfender, & Dias, 2015). Writings continued through Hippocrates in the 5th Century BC (Williamson & Chan, 2015), Dioscorides in the 1st Century AD, Galen in the 2nd Century AD and Avicenna in the 10th

Century AD (Staub, Casu, & Leonti, 2016). This traditional knowledge moved into the public domain in Europe with the widespread printing of books in which herbal lore was made accessible by scholars such as Culpeper in the 17th Century AD, access that persists in modern times with the writing and printing of texts intended for public use. There has however been an increasing drive to define the medicinal uses of plants based on demonstrable scientific evidence. This has resulted in the more circumscribed application of these herbs by the European Scientific Co-operative on Phytotherapy (Krenn, 2017) and the set of WHO Monographs on Selected Medicinal Plants (WHO, 1999), than those recommended by traditional and folklore texts, and intended for the consumption of healthcare professionals.

Ethnobotanical texts contain widespread references to the use of herbs for gynaecological problems, and they appear to represent a significant area of treatment interest (Staub et al., 2016). Modern clinical research has been conducted into traditional herbal medicines used for CPPD in countries such as China (Jang et al., 2014), India and Iran (Javan et al., 2016; Mirabi, Alamolhoda, Esmaeilzadeh, & Mojab, 2014). There have been much fewer trials into Western herbs used for CPPD, however, Germany is one of the main Western countries to have done so probably because it, like the Eastern countries above, still teaches some herbal medicine within its universities (David et al., 2015). In general, the pharmaceutical industry lacks a financial incentive to test WHMs unless pharmacologically active constituents can be identified, extracted and tested in isolation in quantified dosages (Corson & Crews, 2007; David et al., 2015). German herbal therapy for CPPD has been based on using standardised, patented products mostly in tableted dosage forms such as BNO 1095, a *Vitex agnus-castus* preparation (Dante & Facchinetti, 2011). Indeed, whilst the scientific imperative is for standardised doses in order to comply with RCT protocols, any chemical manipulation to standardise medicinal herbs has potential difficulties and flaws (David et al., 2015; Guo et al., 2016). For example, there is scientific evidence demonstrating that apparently ‘inactive' constituents can, by interacting with the active constituents, contribute to the overall action of a herb (Williamson, 2001).

However, standardisation and RCTs represents current best practice in moving towards an evidence base for the use of WHM (Dante & Facchinetti, 2011; Pferschy-Wenzig & Bauer, 2015; Verkaik et al., 2016).

Published clinical trials related to those Chinese herbs that have been integrated into WH practice have invariably been assessed in their most commonly used traditional, fixed formulations (Jang et al., 2014; Kimura et al., 2007; Williamson, 2001). This practice precludes extracting the contribution made by any single herb in the composite formulations. A further complication in interpreting how meaningful the scientific data from Chinese herbal preparations are, compared to that of their Western use, is due to the different way herbs are prepared for use in the two systems. WHs predominantly use tinctures, which are water/alcohol extracts, of the herbs (Jagtenberg & Evans, 2003) whilst the traditional Chinese preparations are tablets/pills or decoctions which are water-based extracts (Jang et al., 2014; Kimura et al., 2007; Pferschy-Wenzig & Bauer, 2015). The solvent and heat used to extract herbal medicines make a difference to the resulting chemical profile (Pferschy-Wenzig & Bauer, 2015). The diagnostic system in Chinese medicine is also very different from that used in the Western model, being based on concepts such as *yin* and *yang* and energy meridians (Vickers & Zollman, 1999b). Western use of Chinese herbs has been made possible by the fact that some clinical and pre-clinical data have been published on them or their constituents, coupled to a limited extent with the translation of conditions for which they were used in TCM (Jagtenberg & Evans, 2003). This Western variation in use of Chinese herbs may reasonably lead to questions of the legitimacy of such a practice.

Preclinical data into herbal medicines, constituted by the examination of isolated constituents, animal and *in vitro* studies fall short of providing true clinical efficacy. Trials using isolated herbal constituents, which mimics the ethos of pharmaceutical preparations (Corson & Crews, 2007), produces outcomes that cannot be extrapolated to the behaviour of the whole herb, which is after all a complex chemical entity (Li, X.-

J. & Zhang, 2008; Williamson, 2001). As mentioned above, the extent to which unknown or unrecognised constituents alter the action of 'active' constituents would be hard to evaluate. Cell cultures and animal models are not guaranteed to provide the same biochemical *milieu* as that encountered in living humans and any alteration, through enzymatic changes for example, that could alter a herb's actual effect remains unverified (Pferschy-Wenzig & Bauer, 2015). The evidence of benefits of WHM for CPPD that is based on preclinical data therefore provides at best a starting point from which further clinical testing can begin.

The study covered in this chapter has sought out relevant human clinical trials using whole herbal medicines, albeit standardised, which would come close to validating the WH use of those commonly prescribed herbs, previously identified, for treating CPPD issues.

7.3 Is there a role for Western herbal medicine in treating cyclic perimenstrual pain and discomfort?

The findings of this study have been published as follows:

Fisher C, Adams D, Frawley J, Hickman L, Sibbritt D. (2018) Is there a role for Western herbal medicine in treating cyclic perimenstrual pain and discomfort? *Australian and New Zealand Journal of Obstetrics and Gynaecology.* Accepted for publication 23rd July, 2018.

A copy of this manuscript appears in Appendix 7.

7.3.1 Commentary

Conventional treatments for cyclic perimenstrual pain and discomfort (CPPD) are diverse and numerous (Marjoribanks, J. et al., 2015). Many of these treatments have

drawbacks including significant costs to users and the health system, some unacceptable side effects (Marjoribanks, J. et al., 2015), interference with women's reproductive function and, importantly, for up to 40% of sufferers a failure to address their symptoms (Marjoribanks, J. et al., 2015). In response, many women have opted to use complementary and alternative medicine (CAM) - a range of diverse health-related practices and products located predominantly outside the conventional medical curriculum and profession (Fisher, C., Adams, Hickman, & Sibbritt, 2016) - to treat CPPD symptoms (Chao et al., 2015; Fisher, C., Adams, et al., 2016; Smith, C. A., Bateson, & Weisberg, 2013). In particular, women who experienced endometriosis and/or frequent premenstrual syndrome (PMS), irregular periods or dysmenorrhea were significantly more likely to consult a naturopath/herbalist than women who did not suffer from these menstrual issues (Fisher, C., Adams, et al., 2016).

Reliable, robust, scientific evidence regarding the efficacy and safety of different CAM for treating CPPD is required to convince stakeholders, including conventional medical practitioners, that such treatments are viable, effective and safe. Such evidence is also important to health policymakers' efforts to fund the efficient integration of proven CAM thereby extending CPPD treatment options available to women.

While many Western herbalists (WHs) prescribe medicinal herb combinations tailored to women's needs, *Vitex agnus-castus* (chaste tree), *Paeonia lactiflora* (white peony), *Angelica sinensis* (Dong quai) and *Actaea racemosa* (black cohosh) are core herbs favoured for treating all four CPPD symptoms. WHs perceive there to be a high level of efficacy for herbal medicine in treating dysmenorrhea, PMS, heavy and irregular periods, with low levels of adverse effects and a potentially positive cost to benefit ratio (Fisher, C., Adams, Frawley, Hickman, & Sibbritt, 2018).

So the questions addressed here are two-fold - is herbal medicine a viable CPPD treatment option? And how well supported are the efficacy and safety of different medicinal herbs in treating CPPD?

7.3.2 *Vitex agnus-castus* (VAC)

VAC is one of the most investigated medicinal herbs for the treatment of CPPD symptoms. Since 2001, seven published systematic reviews have reported that : VAC reduced premenstrual dysphoric disorder (PMDD) symptoms by more than 50% after 2 months, an effect equal to selective serotonin reuptake inhibitors (van Die et al., 2013); VAC was equal to or better than vitamin B_6 in treating PMS, with both providing around 48% improvement (van Die et al., 2013); and efficacy rates for VAC were between 52% to 85% compared to those for placebo which were between 24% to 56%, after 3 cycles of treatment (van Die et al., 2013) with improvement in both physical and psychological domains in PMS and PMDD (van Die et al., 2013). Use of oral contraceptive pills did not appear to affect the results achieved with VAC (van Die et al., 2013) and clinical trials of VAC treatment in dysmenorrhea, have found it to be as effective as oral contraceptives (Aksoy, Gozukara, & Kucur, 2014) and mefenamic acid in menstrual pain reduction (Zeraati, Shobeiri, Nazari, Araghchian, & Bekhradi, 2014). In treating cyclical mastalgia VAC reduced breast discomfort by between 45% to 85% within three months of treatment (Carmichael, 2008).

According to a systematic review of the adverse events (AEs) associated with VAC, these were assessed as mild, reversible and equivalent to placebo. AEs with the highest incidence, reported by 2% - 5% of 9335 users, were nausea, gastro-intestinal disturbances, headache and acne (Daniele, Coon, Pittler, & Ernst, 2005). Apart from a single serious AE of peripheral ischemia, deemed as a 'probable' result of VAC, its use is considered to be without serious risks (Daniele et al., 2005; van Die et al., 2013). There is a theoretical possibility that VAC could interact with drugs that modulate dopamine and pituitary-based hormone therapies although no such interactions have yet been reported (Daniele et al., 2005). Although VAC was found to have no effect on the composition of breast milk its safety during pregnancy and lactation has not been established (Daniele et al., 2005).

7.3.3 *Angelica sinensis, Paeonia lactiflora and Actaea racemosa*

For *Angelica sinensis, Paeonia lactiflora* and *Actaea racemosa*, there are no available clinical trials corroborating their efficacy in treating CPPD. Scientific evidence of their potential benefits for CPPD relies on pre-clinical studies of pharmacological activity in what is a complicated, incompletely understood and multifactorial etiology (Marjoribanks, J. et al., 2015).

What we do know from pre-clinical data for *Angelica,* that may be relevant to CPPD treatment, includes a potential: for anti-inflammatory activity (Li, P. L. et al., 2015); for reducing stress/depression via a brain neurotrophic factor (Shen et al., 2016); for normalising blood cell profiles (Li, P. L. et al., 2015); as a progesterone antagonist reducing heavy bleeding (Ahmed, Yeh, Tang, Cheng, & Ou, 2014) and to alter mood and relax muscles through GABAminergic (Deng, Chen, Lu, et al., 2006) and serotonergic receptor sites (Deng, Chen, Yao, et al., 2006). Putative phyto-estrogenic activity may also mimic reproductive hormone therapy (Ahmed et al., 2014). However, *Angelica*'s anticoagulant properties contra-indicates its use in heavy periods (Li, P. L. et al., 2015). As for *Paeonia*, it has been shown to have potential anti-depressant activity, raising serotonin and dopamine levels, through inhibition of monoamine oxidase activity (Yu et al., 2017) and it may also relieve dysmenorrhea through analgesic (He & Dai, 2011) and anti-inflammatory (He & Dai, 2011) properties, inhibiting both leukotriene B4 and prostaglandin E2 production (He & Dai, 2011).

Although traditionally used in treating menstrual dysfunction (Mercado-Feliciano et al., 2012) no trials have assessed *Actaea*'s effectiveness in alleviating menstrual problems. *Actaea* lacks hormonal activity (Mercado-Feliciano et al., 2012), but pre-clinical studies indicate it is anti-inflammatory (Kim & Kim, 2000), analgesic (Kim & Kim, 2000) and has GABA-A (Cicek, Khom, Taferner, Hering, & Stuppner, 2010) binding properties, possibly

therefore relieving dysmenorrhea. *Actaea* also interacts at serotenergic (Mercado-Feliciano et al., 2012), dopaminergic (Mercado-Feliciano et al., 2012) and opioid (Mercado-Feliciano et al., 2012) receptor sites potentially influencing mood-related PMS issues. Additionally, *Actaea* may alter reproductive hormone levels through pituitary function (Mercado-Feliciano et al., 2012) and reduce excessive bleeding by inhibiting plasminogen activation (Lee, D. Y. et al., 2013). So whilst preclinical data indicate *Actaea* has the potential to benefit CPPD, credible evidence of its clinical efficacy is lacking.

7.3.4 So is Western herbal medicine an option for CPPD?

Currently, evidence suggests a minimum efficacy of 50% and a good safety profile for VAC as a treatment option for CPPD, particularly PMS/PMDD. However, the other commonly used medicinal herbs at present have little scientific validation of their efficacy via clinical trials although none of them have been associated with serious AE concerns, when properly sourced (Izzo et al., 2016).

There remains little objective, scientific support for three of the four core medicinal herbs used by WHs for CPPD patients. This does not necessarily preclude them from having a valuable place in the treatment of CPPD. Lack of financial incentives hamper more extensive research of medicinal herbs through RCTs that could verify their efficacy in CPPD treatment, but in an environment demanding greater scientific corroboration of CAM, anecdotal evidence and traditional credentials alone are insufficient to encourage its acceptance. Conventional health providers and policymakers will inevitably remain sceptical and wary of adopting Western herbal medicine without more compelling scientific evidence.

Seeking out additional treatments are none-the-less desirable given the current failure of conventional therapies to effectively treat CPPD. Currently, conventional health

practitioners and academics in the field of gynecology have urged the need for treatments to be individualised, possibly requiring concurrent use of several treatment approaches (Fisher, C. et al., 2018). Inherent in WHs' practice is the blending of medicinal herbs, tailored to address the individual woman's symptoms, much in line with the recommendation for individualising treatment. While credible, high quality, clinical studies of medicinal herbs and the practice of WHs are needed, a realistic paradigm by which to assess their efficacy in treating women with CPPD is also required, one that fulfills the broader need for using individualised therapy in CPPD patient care.

Women are using Western herbal medicines and consulting with WHs to treat CPPD, irrespective of the paucity of robust clinical trials to support much of this practice. This raises concerns around efficacy and safety that need to be addressed with rigorous scientific investigation. Meanwhile, there is a need for additional options to improve the current treatment of CPPD, for which WHs and herbal medicines, may offer real benefits to women, policymakers and practitioners, none more so than conventional health providers who require such information and assurance in order to effectively and safely co-ordinate care for women with CPPD.

7.4 Chapter summary

The validation for the use of four herbs commonly prescribed by WHs for treating menstrual problems has been assessed in this chapter according to the available scientific data. The four herbs appear to be safe for use. Three of the four herbs, whilst showing potential benefits through their actions determined in preclinical trials, have no clinical data to corroborate their use in treating any of the menstrual problems for which they were being prescribed. The fourth, *Vitex agnus-castus*, has been subjected to numerous clinical trials and whilst accepted as showing evidence of efficacy, clinical trials used in its assessment are not rigorous enough to allow unequivocal acceptance.

Herbal medicines require more stringent testing before they can be endorsed for use by Western conventional medical personnel.

The following chapter will, by considering all data collected in previous chapters, synthesise a final discussion and consider the implications of the results of the research undertaken for this thesis.

8. Discussion

8.1 Chapter introduction

The previous chapters of this thesis have presented aspects of the use of CAM amongst women with CPPD including from the perspective of WHs. The discussion sections of these earlier chapters raise salient issues, findings, limitations, and areas requiring further research effort. This chapter provides a wider context, drawing together a number of new insights emanating from this original research. This chapter also outlines the strengths and weaknesses of the thesis research and overviews areas for future research attention in order to help guide a better understanding of the role of CAM in CPPD treatment.

8.2 Significant findings in the prevalence of Cyclic perimenstrual pain and discomfort and the use of complementary and alternative medicine in its treatment

As was highlighted in section 1.6.5, it is abundantly clear from this research into CPPD that it is a highly prevalent issue affecting most women at some time in their reproductive lives causing a significant level of morbidity. For a minority of women, CPPD is associated with serious and life-altering consequences. The impact of the lost hours or days of women's participation in all aspects of their daily lives for some part of their menstrual cycles extends out affecting family members as well as the wider communities in which they live and work (Dawood, 2006; Dennerstein et al., 2010; Hylan et al., 1999; Milewicz & Jedrzejuk, 2006; Rapkin, 2005; Sharma, A. et al., 2008). Likewise, the cost of managing CPPD symptoms has ramifications across family life, society and the state (Akiyama et al., 2017; Chia, Lai, Cheung, Kwong, Lau, & Leung, 2013; Harlow & Park, 1996; Heinemann et al., 2012; Hylan et al.,

1999; Lee, D. Y. et al., 2010; Missmer & Bove, 2011; Ohde et al., 2008; Pan et al., 2014; Smith, D. R., 2008; Tanaka et al., 2014).

The large ALSWH study has provided a valuable opportunity to glean data from Australian women's experience of CPPD. A significant level of morbidity was established, with over 41% of women aged 34 - 39 years having experienced PMS, one of the most prevalent aspects of CPPD, in the previous 12-month period (Fisher, C., Adams, et al., 2016; Ju, H. et al., 2014). The number of cross-sectional studies available with which to examine the treatment that women have adopted to deal with various CPPD problems is limited. These studies do, however, consistently support the finding that many women appear to choose to manage their symptoms largely through self-help strategies. The prevalence of women seeking conventional medical help for menstrual issues, according to these surveys, is relatively low, ranging from 6% - 48% (Campbell, E. M., Peterkin, O'Grady, et al., 1997; Chia, Lai, Cheung, Kwong, Lau, & Leung, 2013; Corney & Stanton, 1991; Eladawi et al., 2014; Hylan et al., 1999; Lee, D. Y. et al., 2010; Seven et al., 2014; Shapley, Jordan, & Croft, 2002; Sharma, A. et al., 2008; Tanaka et al., 2014; Tolossa & Bekele, 2014). As highlighted in Chapter 2, only 4% - 12% of women consulted a CAM practitioner regarding CPPD symptoms (Brown, M. A. & Zimmer, 1986; Campbell, E. M., Peterkin, O'Grady, et al., 1997; Corney & Stanton, 1991). According to survey data published since 2008, the mean prevalence of CAM use by women with CPPD at 34.4% was much higher (Fisher, C., Sibbritt, et al., 2016). The level of women's consultation rates is likely to vary with the nature of the menstrual symptoms experienced. For instance, heavy bleeding prompts a higher consultation rate than dysmenorrhoea (Lee, D. Y. et al., 2010) and rates also increase when symptoms are more severe and/or life-disrupting (Brown, M. A. & Zimmer, 1986; Hylan et al., 1999; Shapley et al., 2002). None-the-less these data strongly suggest that women either eschew professional treatment of any sort and/or they choose to self-prescribe. Importantly, the research presented in Chapters 2, 4 and 6 clearly

indicates that, whether through self-management or professional consultation, women adopt a variety of CAM for treating CPPD.

In addition, the choice of specific CAM used by women with CPPD provided compelling evidence that those chosen CAM may have been beneficial for alleviating specific CPPD symptoms. In particular, over a seven-year period, women with PMS and endometriosis were higher users of a wide variety of CAM compared to non-sufferers. Their higher associated use of naturopath/herbalists and herbal medicines was contrary to the finding that over that time frame, overall use of these particular CAM within the sample was trending downward, a strong indication that their adoption was linked to specific CPPD problems.

WHs perceived the efficacy of their therapy for treating CPPD issues as high, albeit with some variation across the four CPPD issues studied. PMS and dysmenorrhoea were rated as more amenable to WHM treatment than irregular periods whilst heavy periods were the least effectively treated. This differential may reflect the fact that HMB is difficult to treat adequately even with conventional medical treatments, 46% of such treated cases ultimately resulting in hysterectomies (Marjoribanks, Jane et al., 2016). WHs also assessed their treatment as safe, having few and minor side-effects reported to them by their clients whilst their treatment time frames and costs appeared modest. If substantiated by more detailed research, this treatment option would have important ramifications for women's well-being, their healthcare budgets and those of health providers. However, there appears a general lack of formal contact between WHs and CHPs. Only 19% of the WHs surveyed reported receiving regular referrals from conventional practitioners. This finding was in line with a 2014 survey by Wardle et al. which indicated that 16% of Australian GPs reported making referrals to naturopaths 'a few times' annually (Wardle, J. L., Sibbritt, & Adams, 2014) and was despite the fact that general practitioners, and even some medical specialists, apparently recommended to clients that they consult with WHs regarding their menstrual issues (Fisher, C. et al.,

2018). There is quite obviously some reluctance on the part of CHPs to include the formal use of CAM when treating women with CPPD.

Rigorous clinical research that would support the use of the herbs most often prescribed by WHs for treating menstrual issues is currently lacking, a fact that should be of concern to WHs and is part of the likely reason that many CHPs are reluctant to endorse this CAM therapy. Available data from clinical trials and systematic reviews indicate that VAC is a promising treatment option for PMS, PMDD, dysmenorrhoea and cyclical mastalgia and this herb deserves to be robustly assessed.

8.3 Implications arising from this research

The use of CAM across the world is substantial and unlikely to decrease based both on historical precedence and the rising numbers of people with chronic health problems worldwide who constitute the predominant group of CAM users (Lin, Canaway, & Carter, 2015). CPPD falls within the definition of chronic health problems, having the potential to affect women over the four decade-span of their reproductive lives. There are current deficiencies in conventional treatments for CPPD that have prompted those working in the field of gynaecology to advocate the use of multiple strategies (Fraser et al., 2017; Kaunitz et al., 2008; Milewicz & Jedrzejuk, 2006; Sharp et al., 2002; Yonkers et al., 2008) . Significantly, there is evidence of subjective levels of satisfaction with a variety of CAM by CPPD sufferers as reported in Chapter 2, section 2.3.3.2. In addition, as was observed by Bancroft as early as 1995 (Bancroft, 1995), and embodied in the concept of CPPD (Sharp et al., 2002), women often experience more than one menstrual symptom simultaneously (Pullon, S.R. et al., 1989; Warner et al., 2001) . The therapeutic demand arising from multiple symptoms as reported by women for the previous

year from the 2012 ALSWH data, shown in Table 8.1, further highlights the complexity of managing treatment for these women.

There are important Implications for women, health professionals and health policy managers arising out of the research from this thesis. These implications have been detailed below under the headings of burden, preference, effectiveness and safety - all areas which are closely intertwined for each of these three groups.

8.3.1 Women with CPPD

8.3.1.1 Burden

The personal burden of disease borne by women with CPPD was presented in detail in Section 1.6.5. These burdens included CPPD sufferers' morbidity, lost opportunities in education and work and loss of participation in family, social and work domains. As was also apparent from research data presented in Section 1.6.5, women with CPPD mostly chose to self-manage these monthly problems, including through using CAM. In most Western countries CAM is self-funded meaning women with CPPD have on-going costs associated with the regular need for some form of therapy. This cost is likely to be substantial. As identified in Section 1.6.3, the prevalence of CPPD is high, and of those with the most disabling symptoms, more than 60% will seek professional help from some quarter (Taylor, 2005), involving time as well as possible financial costs.

Apart from the personal distress of CPPD, women bear the regular treatment costs for healthcare products and practitioner costs, whether conventional or complementary. Chronic health problems, which are likely to be experienced by a substantial percentage of women with CPPD, are known to lead to increased CAM use (Falci et al., 2016). Dietary supplements, herbal medicines and chiropractic or osteopathy were identified as those treatments most used by those with chronic health problems from the NHIS survey in the USA in 2012 (Falci et al., 2016).

Whilst specific cost data associated with coping with CPPD are unavailable, general expenditure on CAM has been calculated. In the UK in 1998 the estimated annual expenditure on CAM practitioners from just six modalities (acupuncture, osteopathy, chiropractic, WHM, homeopathy and hypnotherapy) was £450 million,

Table 8.1 The numbers of women with CPPD symptoms in each category and combination of categories based on sample size of 7,427

CPPD category	Number	Percentage
PMS only	967	13.0
PMS + irregular periods	230	3.1
PMS + heavy periods	331	4.5
PMS + dysmenorrhoea	216	2.9
PMS + irregular periods + heavy periods	173	2.3
PMS + irregular periods + dysmenorrhoea	95	1.3
PMS + heavy periods + dysmenorrhoea	534	7.2
Irregular periods only	351	4.7
Irregular periods + heavy periods	131	1.8
Irregular periods + dysmenorrhoea	34	0.5
Irregular periods + heavy periods + dysmenorrhoea	121	1.6
Heavy periods only	244	3.3
Heavy periods + dysmenorrhoea	165	2.2
Dysmenorrhoea only	114	1.5
PMS + irregular periods + heavy periods + dysmenorrhoea	512	6.9
TOTAL	**4218**	**56.8**

representing 22 million visits, 79% of which were paid for by users (Thomas, K. J. et al., 2001). Whilst in the USA individuals' annual costs for CAM/unconventional

practitioner consultations was estimated in 1990 to be worth $524.40 per person with three-quarters of the $13.7 billion for unconventional medical costs representing out of pocket expenditure (Eisenberg, D M. et al., 1993). In 2005, the calculated out-of-pocket CAM spending in the USA was more than $27 billion (Institute of Medicine, 2005), growing to $34 billion in 2007, a third being spent on CAM practitioners (Nahin, Barnes, Stussman, & Bloom, 2009). The majority of out-of-pocket expenses on CAM products was accounted for by the purchase of non-vitamin, non-mineral natural products (Nahin et al., 2009).

Overall, Australian expenditure on CAM in 2004 - 2005 was around AUD$1.8 billion with between AUD$494 million - AUD$1.73 billion for CAM practitioners (MacLennan et al., 2006; Xue et al., 2007). Half of all out-of-pocket expenditure on healthcare products was estimated to have been dedicated to CAM (Xue et al., 2007). Data specifically available for women's expenditure estimated on average $416 a year was spent on CAM professional services and a further $349 on self-prescribed CAM in 2009 (Adams et al., 2011). An early Australian survey of women with PMS reported that 25% of women had tried six or more different treatments in the previous three month period, at least some of which would have demanded out-of-pocket expenditure (Campbell, E. M., Peterkin, O'Grady, et al., 1997).

By taking responsibility for their health, Australian CAM users may be enjoying better health (Thomson et al., 2014b), potentially relieving the pressure within the conventional healthcare system but at a personal cost to themselves. Additionally, whilst the direct and indirect costs of treating CPPD symptoms were discussed in Section 1.6.5, the full impact of how health problems relate to the menstrual cycle is yet to be fully investigated (Johnson, K. A. et al., 2016). For example, amongst healthy women there is an increased need for antibiotics in the luteal phase of their cycles (Johnson, K. A. et al., 2016) whilst anaemia, one consequence of HMB, can impair women's immune function potentially leading to acute infections (Musallam & Taher, 2018).

The data from the 2012 ALSWH study presented in Chapter 4 indicates that women with CPPD problems are significantly more likely to be using a range of CAM practitioners, therapies and products which impose financial and time costs on these women that is yet to be quantified.

8.3.1.2 Preference

Cross-sectional studies have established the level of interest and use of CAM across many countries. As discussed under Section 1.5.9, CAM's growth worldwide has been led by women aged 18 - 44 years old (Harris, P. E. et al., 2012b; Johnson, P. J., Jou, J., et al., 2016; Klein et al., 2015; Peltzer & Pengpid, 2016; Steinsbekk et al., 2011; Thomas, K. J. et al., 2001; Upchurch & Chyu, 2005). This age range is also the most likely time in the lifecycle when women suffer CPPD. In the current consumer-driven environment there is a push for choice in all aspects of life, including healthcare, and the consistent and significant level of CAM use is likely to persist (Fønnebø et al., 2007).

A choice to use CAM is well demonstrated by the public's willingness to themselves pay for products and services. CAM practitioner visits have for some time been equal to or have surpassed visits to CHPs (Eisenberg, D M. et al., 1993; Institute of Medicine, 2005; Xue et al., 2007) with CAM and conventional healthcare attracting an equivalent amount of out-of-pocket public expenditure (Nahin et al., 2009) (MacLennan et al., 2006; Xue et al., 2007). Existing data also indicated that between 6% - 38% of people have chosen to use CAM without having consulted a CHP for treatment (Barnes, P. M. et al., 2009; Del Mundo et al., 2002; Nahin et al., 2010; Thomas, K. J., Coleman, & Nicholl, 2003; Xue et al., 2007). This preference for CAM may be due to reduced access to conventional health care, either through inability to fund treatment (Barnes, P. M. et al., 2009; Nahin et al., 2010) or because of an under-resourced and/or over-stretched public health provision (Hasbrouck &

Waddimba, 2017; Warshaw, 2006). However, data also supports CAM use as a positive choice. People in Norway and Switzerland, for example, have indicated their strong desire to have CAM services made available (Steinsbekk et al., 2009) (Kooreman & Baars, 2012). In Germany, a high interest in CAM emerged amongst adults with chronic diseases which included women suffering from endometriosis (Pieper et al., 2015).

The preference for women with CPPD to use CAM is not well researched. However, women are known to be using multiple strategies themselves to deal with menstrual problems (Campbell, E. M., Peterkin, O'Grady, et al., 1997; Corney & Stanton, 1991; Domoney et al., 2003a; Leather et al., 1993). There is ample evidence that women with CPPD have sought CAM treatments including WHM (Barnes, J. & Ernst, 1998; Chao et al., 2015), acupuncture (Chao et al., 2015; Kuppermann et al., 2007) and dietary supplements (Chao et al., 2015; Chia, Lai, Cheung, Kwong, Lau, & Leung, 2013; Kuppermann et al., 2007). Certainly, in countries where TCM is mainstream, Chinese herbs are one of the main treatments used by women with menstrual problems (Cheng, 2011a; Lee, D. Y. et al., 2010). There is also evidence that women do not use conventional medicine to treat CPPD, possible reasons include their ineffectiveness (Campbell, E. M., Peterkin, O'Grady, et al., 1997; Chen et al., 2006; Hylan et al., 1999; Leather et al., 1993), unacceptable side-effects (Chao et al., 2015; Chen et al., 2006; Cox et al., 2003) or because having consulted their CHP no help was offered (Chapple, 1999; Missmer & Bove, 2011). In women with CPP, the use of CAM was higher if they had had either surgery or used pharmaceutical medicines previously, possibly indicative of a preference amongst these women to use CAM (Chao et al., 2015).

Longitudinal data analysis amongst women with CPP suggested that 75% of those surveyed had used CAM within a 4-year period (Chao et al., 2015). Specifically, amongst CAM modalities, herbal medicine has emerged as one of the most popular amongst women, as discussed in Section 1.5.9 (Posadzki, Watson, Alotaibi, & Ernst,

2013; Upchurch & Chyu, 2005). Amongst rural, USA women attending gynaecology clinics between 1999 and 2003 around 59% of women had used at least one herbal medicine (Glover, Rybeck, & Tracy, 2004) and 27% of women with CPP had opted to use herbs (Chao, Abercrombie et al. 2015).

The data arising from the ALSWH analysis as presented in Chapters 4 and 5 indirectly corroborate a preferential use of some types of CAM for particular CPPD problems. Again, the relative use of herbal medicine amongst women sufferers was higher compared to usage within the whole cohort. However, the true prevalence of use of either CAM or WHM by women with CPPD needs further clarification.

8.3.1.3 Effectiveness

In general, surveys have suggested the public perception is that CAM is effective for primary health care (Barnes, P. M. et al.; Furnham, 2000) and their willingness to pay for it themselves indirectly supports a possible level of efficacy.

Direct perceptions of CAM's efficacy for women with CPPD was reported in the various surveys covered in Section 2.3.3.2. In addition, that prescription rates for PMS have decreased in recent years without an apparent drop in its prevalence, may suggest women have sought alternative healthcare options (Weisz & Knaapen, 2009; Wyatt et al., 2002).

There is an acknowledgment amongst gynaecologists that 40% or more of women with CPPD are not currently benefitting from conventional therapies either because they are ineffective, have undesirable side-effects or are incompatible with women's need to retain their fertility (Borah et al., 2013). Such issues may explain why a significant number of women, when asked, had not sought conventional medical treatment for their CPPD issues (Chia, Lai, Cheung, Kwong, Lau, & Leung,

2013; Corney & Stanton, 1991; Hylan et al., 1999; Ohde et al., 2008; Pullon, S.R. et al., 1989; Seven et al., 2014). A broader range of treatment options is much needed.

It is also possible that treatment gaps are being filled by the range of OTC products readily available to women to deal with their symptoms (Weisz & Knaapen, 2009). Between 28% - 99% of health improvements have been attributed by women to CAM, covering the treatment of PMS, pelvic pain and leg pain due to endometriosis (Chao et al., 2015; Domoney et al., 2003a; Kuppermann et al., 2007; Missmer & Bove, 2011; Pullon, S.R. et al., 1989). Aside from these health benefits, there is the perception that CAM has a lower incidence of adverse effects (Kuppermann et al., 2007; Leather et al., 1993).

8.3.1.4 Safety

Much public CAM use is through self-prescription as is apparent from the much higher use of OTC CAM than CAM practitioner consultations, presented in Section 1.5.5. Eisenberg et al. estimated that 47% of CAM was used without any professional advice at all (Eisenberg, D M. et al., 1993). In Australia, 90.5% of women have reported self-prescribing a CAM (Adams et al., 2011).

The data on CAM use for CPPD corroborates this practice (Campbell, E. M., Peterkin, O'Grady, et al., 1997; Chia, Lai, Cheung, Kwong, Lau, & Leung, 2013; Domoney et al., 2003a). The true level of self-prescription amongst women with CPPD is largely unmonitored but certainly occurs, as highlighted in Chapter 2 (Campbell, E. M., Peterkin, O'Grady, et al., 1997; Chia, Lai, Cheung, Kwong, Lau, & Leung, 2013; Domoney et al., 2003a). Self-prescription would have been facilitated by the easy availability of health products from many more outlets in recent times including the internet (Williamson, 2005).

There are a number of safety concerns arising from the public's practice of CAM self-prescription. Firstly, surveys reveal that multiple CAMs are taken together (Johnson, P. J., Jou, J., et al., 2016; Lin, Canaway, & Carter, 2015) with US women having taken an average of four to seven herbal medicines concurrently (Green, R. R. et al., 2017). However, the extent to which multiple CAMs are being used for CPPD through self-prescription is poorly studied. Any CAM AEs and associated interactions are also largely unrecorded (Williamson, 2005).

Secondly, self-prescription without professional advice raises questions of relevancy of the choice of CAM as well as the appropriate dosing and duration of treatment. In addition, there is the concern that self-treatment may delay professional medical assessment and the instigation of more effective treatment (Wardle, J., Weir, Marshall, & Archer, 2014). Some OTC CAMs have also been exposed as making unproven health claims such as homeopathics promoted as an effective replacement for vaccines (Wardle, J. et al., 2014).

Thirdly, the public perception is that that CAM is both natural and subject to government regulation that would ensure its safety (Del Mundo et al., 2002; MacLennan et al., 2006; Nicholson, 2006). Most people also lack awareness of CAM AEs with 97% of CPP sufferers, for example, unaware of potential AEs associated with their herbal medicine use (Chao et al., 2015). Beliefs about CAM safety may further lead to issues of over-use. Although to-date studies on CAM have found them to be associated with low levels of AEs, this may simply reflect inadequate reporting. There is evidence of harms caused from CAM use (Wardle, J. et al., 2014) or through substitution, adulteration and/or contamination particularly of OTC products (Letsyo, Jerz, Winterhalter, Lindigkeit, & Beuerle, 2017; Wardle, J. et al., 2014). There is a further issue with the reliability of some OTC CAM such as WHM where Australian research identified that 20% of marketed products were not registered for sale and 60% contained ingredients that differed in quantity or species to that specified on the label (Blacksell, Byard, & Musgrave, 2014).

A further safety concern is that often a variety of CAM and/or conventional medicines are used simultaneously (Adams, Barbery, et al., 2013) and without professional oversight. In the USA 15 million adults were taking high dose vitamins or herbal medicine with prescription medicines (Institute of Medicine, 2005). From surveys, anywhere from 16% to 71% of CAM users were also using conventional medical treatment (D'Onise et al., 2013; Kannan et al., 2010; MacLennan et al., 2006; Nicholson, 2006; Spinks & Hollingsworth, 2012; Stankiewicz, Smith, Alvino, & Norman, 2007; Thomas, K. J. et al., 2003; Thomson et al., 2014a; Xue et al., 2007). In fact, users of conventional medicines may be up to two times more likely to also be using CAM medicine than those people not on conventional medications (Chao et al., 2015; D'Onise et al., 2013). The full extent of interactions of CAM and pharmaceuticals is unknown (Williamson, 2005), but to-date a few CAM, such as St John's wort, have been found to have unwanted interactions with a variety of pharmaceutical medicines (Velingkar, Gupta, & Hegde, 2017). There is evidence from surveys that women use CAM and pharmaceuticals together (Chao et al., 2015; Cheng & Lin, 2011; Sharma, A. et al., 2008), but any associated pharmaceutical interactions are largely unrecorded (Williamson, 2005). Allied to this practice, often CAM use is not disclosed to medical practitioners (Adams, Barbery, et al., 2013), at best around half of CAM users are likely to make such disclosure (MacLennan et al., 2006; Thomas, K. J. et al., 2001). Amongst women CAM users being treated for infertility in Australia, 42% failed to disclose this fact to their CHPs (Stankiewicz et al., 2007).

8.3.2 Health professional perspective

8.3.2.1 Burden

The demand for professional health services, based on projected health problems, is going to rise significantly (Hasbrouck & Waddimba, 2017) placing stress on the

time and budgets of the conventional primary health sector. CAM practitioners could ease this stress by extending the provision of healthcare services, particularly in areas where the spread of healthcare resources, such as rural areas, are limited (Adams, Sibbritt, et al., 2013; Hasbrouck & Waddimba, 2017).

Of the 22 million CAM practitioner visits in the UK, 2 million were initiated through the NHS (Thomas, K. J. et al., 2001) suggesting that some conventional practitioners find value in incorporating CAM practitioner services. Furthermore, research undertaken between 2006 - 2009 found that GPs with CAM knowledge are more economical, possibly saving a third on healthcare costs and reducing mortality rates (Kooreman & Baars, 2012). The inclusion of CAM practitioners within standard healthcare would allow the same health advantages to pertain whilst limiting the need for additional CAM training by GPs, some of whom may not wish to undertake this extra educational burden.

A USA survey by Kraemer and Kraemer identified that in the late 1990s only around 12% of women with PMS were first diagnosed with the problem by their physicians (Kraemer & Kraemer, 1998). In women with multiple health problems, over-stretched CHPs may simply not have time to enquire into menstrual issues if that is not the primary reason for consultation. CAM practitioners appear to have longer consultation times, routinely obtaining medical histories, which could be shared with other healthcare providers. Co-operative healthcare could enable streamlining of services as well as the optimal use of conventional health services. In addition, the holistic nature of many CAM therapies, such as WHM, allows for multiple issues to be addressed within a single consultation. This situation contrasts with the limited time frames within constrained GP practices which would normally require multiple consultations and therapeutic options, involving the utilisation of greater numbers of health resources (Britt et al., 2014).

From the survey of WHs presented in Chapter 6, it is apparent that WHs are currently regularly treating women with CPPD. Nearly all acupuncturists in Australia and New Zealand also reported providing treatments for women with PMS, primary dysmenorrhoea and HMB, amongst other gynaecological problems over a 12-month period (Smith, C. A., Armour, & Betts, 2014). For both acupuncturists and WHs, most referrals originated from other CAM practitioners. However, there was still between 19% - 44% of referrals from CHPs. Whether this contact occurs formally or not, this still represents a significant level of recognition by CHPs that CAM practitioners could play a role in effectively treating CPPD, easing their burden in treating these problems. More shared care, alleviating the pressure on stretched GP services, are currently likely to be limited at least in part, by the lack of state funding to cover CAM consultations.

8.3.2.2 Preference

It is not only the public that has expressed a desire for increased access to CAM. As far back as 1982, 86% of GP conference attendees in the UK, canvassed anonymously, indicated they had a positive attitude to CAM, 30% had made referrals to CAM practitioners, and 22% had visited a CAM practitioner themselves (Reilly, 2001). By 1993, three quarters of GPs participating in the NHS wanted CAM available through publicly funded services (cited by Fisher and Ward) (Fisher, P. & Ward, 1994). In 2001, just under a half of GPs in England were providing their clients with access to CAM therapies and around 12% had incorporated CAM practitioners into their practices in spite of funding restrictions on CAM access (Thomas, K. J. et al., 2003). Independent CAM practitioners within conventional medical practices doubled, and CAM provided within the primary care setting increased by 38% from 1995 to 2001, whilst WHM access through GPs increased from 1.5% to 2.7%, mostly client-funded (Thomas, K. J. et al., 2003). A systematic review of CAM use by UK physicians reported an average referral rate of 39% and

an average of 46% who recommended CAM (Posadzki, Alotaibi, & Ernst, 2012). Even amongst hospital physicians, 41% referred patients to CAM and 10% referred patients for WHM from within their private practice (Lewith, Hyland, & Gray, 2001).

More specifically, CHPs have indicated their support for the inclusion of CAM therapies in their spheres of gynaecological practice (Gordon et al., 1998; Münstedt et al., 2014). German medical practitioners are funded to offer a certain level of CAM therapy. A survey in Hesse in 2013 found over 17% of gynaecologists and obstetricians co-ordinated women's healthcare with CAM providers, a practice especially prevalent amongst their younger members (Münstedt et al., 2014). Around 20% of gynaecologists referred women with PMS to CAM therapists, with 56% recommending WHM (56%), 27% dietary supplements and 48% homeopathy (Münstedt et al., 2014). There was less interest amongst women with endometriosis for CAM treatment, but WHM and homeopathic treatment were recommended by around 11% of specialists (Münstedt et al., 2014).

In reality, women with CPPD are being treated by CAM practitioners, and in the case of WHs, this appears to be occurring with regularity (Barnes, J. & Ernst, 1998) and with some significant success according to PRACI WHs who provided data presented in Section 6.5.2. CAM therapists are predominantly consulted by women (MacLennan et al., 2006; Xue et al., 2007) and their exposure to treating CPPD is likely to be high. In the case of surveyed WHs women made up 78% of their clientele and as stated above Australasian acupuncturists too have reported regularly providing treatments for women with CPPD (Smith, C. A. et al., 2014).

8.3.2.3 Effectiveness

Conventional medicine is generally far better at treating acute diseases than chronic illnesses (Reilly, 2001). However, even within acute medical practice, there are

growing problems such as bacterial resistance to antibiotics (Escudero-Oñate, Ferrando-Climent, Rodríguez-Mozaz, & Santos, 2018) and unacceptable side effects from pharmaceutical medications (Grosser, Ricciotti, & FitzGerald, 2017) including those used in treating CPPD (Kaunitz et al., 2008). There is evidence that 62% - 83% of CAM users had previously sought conventional treatment for the same problem, possibly indirectly indicative of problems associated with using conventional medicine (Eisenberg, D M. et al., 1993; Thomas, K. J. et al., 2001).

There is an obvious need to increase effective healthcare options in general, as well as related to CPPD. Effective healthcare that involves both CAM and CHPs integrating their services to develop the most appropriate therapeutic program would best serve the public, this being the ideal situation expressed by those using both disciplines (Lin, Canaway, Carter, & Manderson, 2015). This focus on outcomes for end users of medical services is gaining in importance in standard conventional healthcare (Romeyke, Nöhammer, Scheuer, & Stummer, 2017).

CHPs have acknowledged the need for effective and individualised therapy in treating CPPD (Grant et al., 2000; Sharp et al., 2002; Taylor, 2005; Yonkers et al., 2008). In general, CAM therapists such as WHs, through their long consultation times are more likely to identify secondary CPPD problems that require attention whereas time pressures attached to GP practice where the norm is to deal with a single issue per visit (Britt et al., 2014) means these problems may be missed if CPPD was not the presenting problem. Currently, formal referrals between conventional health and CAM professionals are at low levels, but better co-operation and appreciation of the place of all health professionals could enable shared insights as well as economies in time and integration of health services that would make healthcare effective for its users (Lin, Canaway, & Carter, 2015).

Amongst herbal medicines, for example, RCTs have supported VAC as probably effective and safe for the treatment of a variety of CPPD issues (Jang et al., 2014;

van Die et al., 2013; Verkaik et al., 2016). Good quality clinical trials if supported by acceptable methodology, as discussed in Section 7.3.1, and peer-reviewed scientific data would help to bridge the current gaps in treatments and trust amongst CAM and conventional health practitioners.

8.3.2.4 Safety

Lack of professionally supervised CAM use, as well as concurrent use of multiple products, is an issue for all health professionals. Possible reasons for the public failure to disclose CAM use to CHPs have included: doctors negative responses to this practice in the past (Del Mundo et al., 2002; Lin, Canaway, & Carter, 2015); a belief it was irrelevant; or that doctors never enquired into CAM use (Del Mundo et al., 2002; Xue et al., 2007). These reasons should signal a strong need for CHPs to be more vigilant in enquiring into CAM use whilst being non-judgmental about clients' health choices if they are to be better placed to provide safety advice. To enable CHPs to supply objective advice, they require accurate, reliable clinical information of potential interactions with pharmaceutical medicines and realistic probabilities of risks of AEs regarding CAM. This same need exists for CAM practitioners. The field of CAM-drug interactions is sadly understudied, with information often based on poor quality data to guide any assessment of safety and probable contra-indications (Izzo, 2012).

Whilst 10% of GPs are trained in CAM use in the UK, on average 25% of them reported providing patient access to CAM, raising both ethical and safety concerns (Posadzki et al., 2012). Likewise amongst hospital physicians and/or their teams only 5.2% of CAM users had appropriate training although a third were using it in their practices (Lewith et al., 2001). Up to 38% of GPs using CAM have reported AEs amongst their clients, higher than the 5% reported by the public for CAM use (Posadzki et al., 2013) and also WHMs (Williamson, 2005). This discrepancy may

reflect a better system of reporting by GPs or their particular CAM use is at fault (Posadzki et al., 2012).

The lack of reliable clinical evidence amongst CAM professionals has led to variations in the use of some CAM medicines. This variation was exposed in the case of herbal medicines used by WHs in Section 7.3.3 where the adoption of medicinal herbs from the Chinese system has led to their being used without the existence of clear clinical evidence. Clearly, there is a need for good quality research into CAM to ensure that the professional usage adopted is both effective and safe.

Fewer AEs have been reported in the Netherlands amongst CHPs with CAM knowledge (Kooreman & Baars, 2012). The safety record of CAM is well supported by published RCTs evaluating CAM used for treating CPPD that have reported low levels of AEs (van Die et al., 2013; Verkaik et al., 2016). This contrasts with the AEs associated with the conventional management of CPPD, highlighted in Section 1.6.6, some of which can have serious consequences. However, CHPs and CAM practitioners need to better communicate with each other and to set up a joint system to monitor interactions to improve public safety (Chao et al., 2015; Lin, Canaway, & Carter, 2015).

8.3.3 Health policy perspective

8.3.3.1 Burden

In developed countries, a burgeoning aging population (Uijen & van de Lisdonk, 2008) is a function of both extended life expectancy and reduced fertility/birth rates (Australian Demographic Statistics, 2014). In 2016, one third of the USA population was 50 years or older (Johnson, P. J., Jou, J., et al., 2016). More than a quarter of Americans have 2 or more chronic health issues (US Department of Health and Human Services, 2010) and the aging population will be a factor likely to add to increasing levels of chronic illness (Falci et al., 2016). However, there are also

significant levels of chronic ill health in younger age groups (Ward & Schiller, 2013) due to changes in socioeconomic parameters that have led to unhealthier diets, poorer exercise levels and rising levels of lifestyle-induced health issues (WHO, 2014). The healthcare cost associated with caring for people with multiple chronic health issues alone was estimated to represent two-thirds of all state health costs (US Department of Health and Human Services, 2010). This will impose a high burden on health services in the future.

In Australia, 14.7% of the population in 2014 were over 65 years (Australian Demographic Statistics, 2014) and this age group is projected to rise to around 20% of the population by 2030 (Johnson, P. J., Jou, J., et al., 2016). Healthcare costs for chronic illness in Australia have increased (Britt et al., 2014) and must concern Australian health-policy managers. Spinks and Hollingworth identified chronic ill-health was a determining factor in Australian's CAM use, that more people surveyed used CAM only than used GP services only and that CAM users used less prescription medicine for chronic health problems (Spinks & Hollingsworth, 2012). CAM has been used for health maintenance (Spinks & Hollingsworth, 2012) across a range of modalities and health problems (Herman, Poindexter, Witt, & Eisenberg, 2012). In the Netherlands CHPS with CAM qualifications delivered savings of up to 30% and reduced mortality rates when compared with CHPs without such qualifications (Kooreman & Baars, 2012). Therefore state-funded CAM needs to be properly assessed, regulated and, where proven to be effective, integrated into healthcare.

As identified in Section 1.6.3, the prevalence of CPPD is high and of those with the most disabling symptoms more than 60% will seek professional help from some quarter (Taylor, 2005). Together these factors will not only increase the levels of illness borne by the public but will also strain the ability of healthcare providers to continue to provide the required level of front-line practitioners (Goodman, Posner, Huang, Parekh, & Koh, 2013; Ward & Schiller, 2013).

Whilst comparative evaluations of the relative costs of complementary and integrative healthcare have been undertaken for a number of health problems, there are no evaluations available specifically regarding women's health (Herman et al., 2012). The exception was a German study which reported health savings achieved through using acupuncture in the treatment of dysmenorrhoea (Herman et al., 2012). Compared to the $416 per year spent by Australian women on CAM professional services (Adams et al., 2011), the equivalent average cost per person accessing conventional primary healthcare was $6,230 in 2013 - 14 (Britt et al., 2014)., As women were higher users of this care the average cost per women is likely to be higher still, a cost borne predominantly by the state (Britt et al., 2014). A more direct comparison of relative costs comes from that of the out-of-pocket expenses of pregnant women where conventional practitioner maternity costs were over four times higher than that of professional CAM costs (Adams, Steel, Frawley, Broom, & Sibbritt, 2017). These differential costs impose a financial burden on the state health sector whether it is providing either full or subsidized healthcare.

Surveys consistently show that a significant number of women are reluctant to consult CHPs about their menstrual problems. This may be because women have accepted their menstruation as natural (Hylan et al., 1999; Sharma, A. et al., 2008), or because CHPs have minimized its importance (Chapple, 1999; Hylan et al., 1999; Tanaka et al., 2014). In countries where GP visits are not state subsidized, the cost of health insurance or CHP visits may be a deterrent. Focus group information also suggests that in some cases, certainly in the past, CHPs have been dismissive of women with CPPD symptoms (Byles et al., 1997; Chapple, 1999; Cox et al., 2003). Failure to adequately treat women with CPPD results in a burden on the state from lost productivity, income and social capital. There are also potential increased therapeutic costs downstream, exemplified by the ineffective treatment of HMB that eventually leads to hysterectomies (Graham et al., 2008; Hussain et al., 2016), up to 41% of which may result in complications (Spilsbury et al., 2009).

The high rates of WHs treating CPPD, which would be mostly paid by women themselves, strongly suggests that women find this treatment beneficial. The costs of unpatentable CAM products, such as WHMs and homeopathics, are low in comparison to prescription medicines and there may also be savings from reduced primary healthcare visits and hospital services (Kooreman & Baars, 2012). For women with CPPD the occurrence of multiple issues, as shown in Table 8.1, is well documented (Bancroft, 1995; Ju, H. et al., 2014). In conventional medicine treating multiple symptoms would likely involve more than one therapeutic agent. Even for the same CPPD issue, more than one approach may be needed (Sharp et al., 2002; Taylor, 2005). For example, for women with HMB referrals from GPs to secondary healthcare resulted in half of the women receiving surgery (Grant et al., 2000). These women had probably received pharmaceuticals such as mefenamic or tranexamic acid as they are first-line treatments (Grant et al., 2000; Heikinheimo & Fraser, 2017). Women attending a PMS clinic were on average likely to have tried three prescribed drugs prior to referral (Leather et al., 1993). This confirms that standard treatments lack good efficacy, necessitating additional treatment and adding to any state-funded costs.

The goal of the Australian National Women's Health Policy of 2010 was to improve the health and well-being of this sector of Australia's population. To achieve this the best of all treatment options needs not only to be made available but delivered in a co-ordinated, cost-effective and efficient way (Department of Health, 2010)(Department of Health, 2010)(Department of Health, 2010)(Department of Health, 2010)(Department of Health, 2010)(Department of Health, 2010)(Department of Health, 2010)(Department of Health, 2010).

8.3.3.2 Preference

At health policy level, the UK National Health System (NHS) guidelines, published by NICE and designed to standardize health information and advice, is based on the best evidence which is made available to physicians and patients to assist them in choosing the most appropriate care. Interestingly, an examination of the guidelines for 2013, developed in the absence of CAM experts, found various CAM modalities were mentioned, those with the greatest frequency were acupuncture, herbal medicine and yoga (Lorenc et al., 2014).

Based on survey data, health policy managers need to acknowledge that there is a preference amongst some women to use CAM to treat CPPD, especially given the relatively low uptake of CHP consultations for this treatment. Indeed, in countries where CAM is integrated into the state health provision such as Taiwan and Japan, there is a strong indication that CAM services provide a significant contribution to the care of women with CPPD. For example, in Taiwan over half of women with dysmenorrhoea were cared for by TCM practitioners, almost exclusively using Chinese herbal medicine (Pan et al., 2014); and in Japan TCM was prescribed at high rates across a variety of CPPD conditions, being the second most commonly prescribed medication for PMS (Tanaka et al., 2014).

At all levels of CHP-delivered healthcare, as well as from the public, the choice to utilize CAM as part of the treatment of CPPD has been expressed; a signal for health policy managers to investigate the potential of these therapies to contribute to women's healthcare.

8.3.3.3 Effectiveness

In countries where state-funded health services are provided, these services must be based on effective outcomes. Most developed countries have some healthcare

provision largely based on conventional medicine (Fønnebø et al., 2007). For health policy managers, the integration of CAM into healthcare is the promoted aim of WHO global strategy for the future of CAM to "harness the potential contribution of traditional (and complementary) medicine to health, wellness and people-centered health care" (Burton et al., 2015). The countries that incorporate CAM into mainstream healthcare are those where traditional practices are still strong and taught alongside conventional medicine, such as Taiwan and Korea (Hsieh et al., 2008; Ock et al., 2009; Pan et al., 2014). As mentioned in the previous section, over half of Taiwanese women with primary dysmenorrhoea received mainly Chinese herbal medicine treatment (Pan et al., 2014). The fact that the state supported women's choice to use TCM, by covering its cost as an optional treatment, must be based on the therapy achieving positive results.

CAM was mentioned in 16% of NICE 2013 guidelines (Lorenc et al., 2014) and 10% of guidelines for the German equivalent in 2010 (Kraft, 2009), providing a positive assessment of efficacy for these options. Clinical guidelines are intended to disseminate optimal and standardised strategies for healthcare and including all relevant CAM in these guidelines would raise awareness of their benefits amongst CHPs and the public. It would also encourage greater integration of, and access to, CAM within mainstream healthcare. As previously quoted, the comparison of clients treated in the Netherlands by GPs with CAM qualifications and those without indicated greater levels of treatment satisfaction and fewer AEs (Kooreman & Baars, 2012). In most Western countries, where CHPs offer CAM they can do so without having been fully trained in the modality (Giannelli, Cuttini, Da Frè, & Buiatti, 2007; Owen, Lewith, & Stephens, 2001).

Australian health service managers with responsibility for integrative health services in the community and hospital settings, acknowledged that CAM increased the holistic capacity on offer, filled therapeutic gaps in services (including for chronic

conditions), improved accessible, patient-centred healthcare and added to the options available to healthcare users (Singer & Adams, 2014).

There is limited or no financial cover for many CAM therapies, with a minority of CHPs providing some of these services, such as acupuncture. CHPs effectiveness in CAM therapies needs to be carefully monitored given that often their training in such modalities is less comprehensive than that undertaken by properly qualified CAM practitioners (Owen et al., 2001). Furthermore, the public who use CAM, whether privately funded or through private health insurance, are currently doing so based largely on limited evidence of its efficacy. Supporting research into CAM efficacy is needed based on public preference, to extend treatment options and for reasons of safety.

In Western countries, reliable data relating to CAM for CPPD is lacking. Systematic reviews have highlighted possible effective CAM therapies for CPPD, but invariably more robust trials are needed to confirm their efficacy (Dante & Facchinetti, 2011; Fugh-Berman & Kronenberg, 2003; Jang et al., 2014; Verkaik et al., 2016). Clinical trials comparing VAC with SSRIs for treating PMDD (Atmaca, Kumru, & Tezcan, 2003) or bromocriptine for mastalgia (Kilicdag et al., 2004) have indicated efficacy levels that are favorable for the herb. Further scientific research needs to be supported to establish whether VAC provides a valuable alternative for treating CPPD, given its low level of side effects (Izzo et al., 2016) and suitability for use in women wishing to retain their fertility.

CAM in general used in treating CPPD is a promising area of research deserving support from health policymakers. Benefits could include improving both women's health and health costs. A better understanding of women's treatment preferences and knowledge about the benefits and risks of CAM would facilitate a more efficient and co-ordinated service (Kronenberg et al., 2006). The new perspective in health provision is to give value to the end-users, the public. This focus gives additional

reasons for health policy managers to investigate the value of incorporating CAM into the health provision (Lin, Canaway, & Carter, 2015). Also, integral to health policy managers providing effective health cover is the question of accessibility of services, whether this is geographical or financial, the latter being shaped by healthcare policy particularly for those with low levels of disposable income.

In Canada, accessibility studies of health practitioners of all types, CAM and conventional, suggests that rural and urban populations use CAM services equally (Williams et al., 2011). However, some forms of CAM such as chiropractic and massage therapists are frequently amongst the most accessible practitioners for rural communities for whom they are providing a valuable contribution to healthcare access (Meyer, 2012).

Amongst English GPs in 2001, just under half provided access to CAM predominantly to support people with chronic illness or the elderly (Thomas, K. J. et al., 2003). At that time, the provision to access WHM was provided by just 2.7% of practices, but only half of this was through NHS referrals to WHs practicing independently and outside conventional medical health centres (Thomas, K. J. et al., 2003).

Across the European Union, there are an estimated 300,000 CAM practitioners, 60% of whom are non-medically qualified (Fischer, F. H. et al., 2014). There are more non-medically qualified than medically qualified CAM therapists in Germany registered as CAM providers. In spite of this, CHPs not CAM practitioners, tend to dominate CAM provision in acupuncture and homeopathy with an equal number of herbal medicine practitioners amongst the medically qualified and non-medical practitioners.

In Australia, there is evidence that CAM practitioners can help to extend geographical access to healthcare services particularly in non-urban areas that lack

access to CHPs (Adams et al., 2011; Wardle, Jon, Adams, Magalhães, & Sibbritt, 2011). However, whilst less rural-based women were satisfied with access to CAM practitioners than urban-dwelling women, there was still a perceived lack even in urban areas suggesting there needs to be greater access to CAM practitioner services nationwide (Adams et al., 2011). The significant uptake of CAM treatment across the whole of Australia, both in urban and non-urban areas, highlights a need for improved, affordable access to these therapies (Adams, Sibbritt, et al., 2013).

There is likely to be an under-utilisation of CAM health practitioners based on the negative conventional medical perception of their validity (Grace, Vemulpad, Reid, & Beirman, 2008). The diversity in professional registration rules across CAM modalities, as well as their legal and educational status, needs to be standardised. This would give greater assurance to CHPs of CAM practitioner skill levels and encourage a better perception by CHPs of non-medically qualified CAM practitioners (Grace et al., 2008; Von Ammon et al., 2012). In this way, public access to CAM could improve, and an integrated healthcare would be provided that has a more effective and efficient delivery system (Meyer, 2012; Thomson et al., 2014a).

8.3.3.4 Safety

The European Commission recognised that due to extensive public use of CAM, it demands proper assessment. Improved data collection and objectively assessed benefit-to-risk ratios would enable health policy managers to identify and accept cost-effective CAM (Fischer, F. H. et al., 2014). Contradictory advice given to clients regarding the relative benefits of CAM versus conventional medicine is unhelpful for the end-users of their services (Klein et al., 2015). There is a need for health policy advisors to ensure a co-ordinated approach to care by encouraging CAM practitioners and CHPs to co-operate in the interests of users (Lin, Canaway, & Carter, 2015). Proper assessment of CAM by health authorities will enable benefits

to be maximized and better safeguards to be established so that the public and health professionals alike can have confidence that standard healthcare is properly integrated, transparent and effective.

The majority of the reported AEs and interactions relating to WHM are currently arising from case reports or post-marketing surveillance of CAM products (Izzo, 2012), health professionals reporting of these events being advised rather than mandated in Australia (TGA, 2005). Whilst the breakdown of adverse events in Australia in a 2003 review highlighted only 3% were due to CAM (Expert Committee on Complementary Medicines in the Health System, 2003), the majority of CAM has not been subject to proper safety testing. Furthermore, CAM is not regularly sanctioned for misrepresentation of health claims, not fully tested for *in vivo* human interactions with conventional medicine and its AEs are not necessarily routinely logged (Fischer, F. H. et al., 2014; Wardle, Jon et al., 2011). This needs to be remedied at a health policy level. CAM safety could also be improved by proper government regulation of the industry including regulation of CAM practitioners and by standardizing the quality of educational training (Wardle, J. et al., 2014).

AEs were lower amongst women taking VAC than in the pharmaceutical comparators, being largely similar to those experienced in placebo groups (van Die et al., 2013). Critical evaluation of available clinical information has concluded that WHM has a better tolerance amongst users than pharmaceutical medicines (Izzo et al., 2016). Women who have been on a high, sustained level of CAM to treat CPP have indeed reported low levels of AEs. Therefore, CAM integration into CPPD treatment strategies seems desirable, particularly in areas like CPP and CPPD where conventional medicine is problematic (Chao et al., 2015). However, this would first require proper regulation of the CAM industry.

8.4 Limitations of research

8.4.1 Definition of terms

Studies into CAM prevalence of use, undertaken since the early 1990s, have not adopted a single, standardised list of modalities or criteria in defining the practices being ascertained. Surveys over time are therefore inevitably measuring changes with potentially differing baselines making direct comparisons difficult. Additionally, for the public and researchers, an understanding of what constitutes CAM is likely to vary. Some research supplied respondents with CAM lists (these may have differed between studies), whilst others have left this open to public interpretation. Increasingly CAM is also being delivered by CHPs and the public may not perceive such treatment as CAM. These differences in CAM definition may affect data reliability.

The medical understanding of menstrual issues has also evolved over the last few decades and as is apparent from the literature problems also exist in CPPD definitions - there is no consensus on the definition of PMS for example. This lack of clarity is exacerbated by the wide range of possible symptoms associated with CPPD. For women themselves these definitions are likely to be even less clear, many accept their menstrual experiences as a natural part of womanhood and may not identify their symptoms as due to CPPD. Whilst PMDD is defined through DSM criteria, the other main areas of menstrual problems are more subjectively assessed relying on personal thresholds, such as pain levels in dysmenorrhoea or the volume of menstrual blood loss in HMB. Added to these definition issues is the potential varying nature of CPPD from one month to the next. The identification of CPPD is therefore subject to mislabeling.

8.4.2 English language

All the research for this thesis has been based on studies reported in the English language. There is, therefore, the possibility that important information in other languages may have been missed. This fact may also reduce the generalizability of the data.

8.4.3 Lack of direct causality

Data derived from cross-sectional studies of women with CPPD and their associated CAM use do not necessarily confirm a causal relationship as women have not always been asked if their CAM use was specifically related to treating CPPD.

8.4.4 Potential Biases

The willingness of respondents to participate in surveys is associated with a potential selection bias. Much of the cross-sectional data used in this research were collected retrospectively and as such is also subject to recall bias, both for women participants and WHs. Finally, the low response rate amongst WHs may have introduced a non-response bias which would affect the representativeness of their data.

8.5 Strengths of research

This thesis is the first comprehensive research into the area of CAM use in women with CPPD and as such it provides a baseline for further study and is an important initial insight into the subject.

Statistical analysis of data used in Chapters 4 and 5 was able to take advantage of the large databases available within the areas of interest, thus providing sufficient

statistical power to undertake detailed analyses. ALSWH provided a large representative sample of women within the most important age range in which to measure the prevalence of CPPD and the associated use of CAM. The regular series monitoring the same ALSWH participants also provided an important opportunity to monitor changes with aging of both CPPD prevalence and CAM use, and their association, providing a historical context to the data.

WHM emerged as one of the main modalities used by women with CPPD for which there is a current dearth of in-depth information. Access to WH participants in PRACI afforded a unique opportunity to gauge the attitudes and perceptions of front-line WHs in treating CPPD, thereby providing an important insight into the potential for WHM to fill a therapeutic gap in treating this prevalent women's health issue.

8.6 Future research

The information that has emerged from this thesis highlights a number of important avenues warranting further research into the important topic of which CAM, if any, may have value in treating women with CPPD who are currently faced with unmet health needs.

8.6.1 Improved healthcare for women

Both the drop in conventional prescriptions for PMS (Weisz & Knaapen, 2009; Wyatt et al., 2002) without a commensurate drop in levels of PMS and the fact that women are self-treating CPPD strongly indicates new treatment options are required. The current conventional medical treatment of CPPD is inconsistent and has been acknowledged as providing variable efficacy. At the same time, WHs have recorded PMS as one of the main reasons for women's consultations with them

(Wyatt et al., 2002) and the survey of Australian WHs identified high levels of confidence in treating CPPD whilst other CAM also have a limited evidence base for efficacy in its treatment. Clearly, there are a number of important avenues of research needed to progress possible alternative treatment options for women with CPPD.

8.6.1.1 Clinical studies of CPPD treatment

Variability in methodology is frequently cited in systematic reviews as the reason for their failure to fully endorse many clinical trials tested for treating CPPD including hormone therapy for HMB as well as acupuncture, NSAIDs and OCPs for dysmenorrhoea and VAC for PMS (Haywood, Slade, & King, 2002; Lethaby et al., 2015; Marjoribanks, J. et al., 2015; Smith, C. A. et al., 2016; van Die et al., 2013; Verkaik et al., 2016; Wong, C. L. et al., 2009). This criticism relates to outcomes for both conventional and CAM RCTs.

Variation occurs in the diagnostic definition of CPPD issues, as well as in the assessments used to measure treatment outcomes (Lethaby et al., 2013; Marjoribanks, J. et al., 2015; Marjoribanks, Jane et al., 2016; van Die et al., 2013; Verkaik et al., 2016; Wong, C. L. et al., 2009). Diagnostic criteria for establishing aspects of CPPD have been considered by authoritative bodies such as AWHONN (Sharp et al., 2002) and the American College of Obstetricians and Gynecologists (Kaunitz et al., 2008). Acceptable quantitative criteria based on the National Institute of Mental Health for establishing PMS in women stipulates that PMS is significant, if over two consecutive cycles, the intensity of their symptoms changes by 30% when comparing scores measured on the six days prior to menstruation with those measured on days five to 10 of the cycle, with a specified level of changing symptom severity (Haywood et al., 2002). There are a variety of recognised PMS questionnaires such as the Menstrual Distress Questionnaire

(MDQ), the Daily Symptom Rating Scale (DSRS), the Calendar of Premenstrual Experiences (COPE) and the Premenstrual Assessment Form (PAF), which are dependent on women self-completing them. However, they are varied in the scope and focus of questions, their levels of validity, the age group of women from which base-line symptoms were derived, whether they are required to be completed prospectively or retrospectively and the timeframes over which monitoring occurs (Haywood et al., 2002; Marjoribanks, J. et al., 2015). Whilst there are advantages and disadvantages inherent in each type of survey instrument currently employed (Haywood et al., 2002) they have not necessarily incorporated the recommended basic National Institute of Mental Health criteria for establishing a diagnosis of PMS. Researchers in the field of CPPD need in the first instance to investigate which diagnostic tools to adopt to ensure data is meaningful, clear and comparable as well as ensuring the tools are effectively covering the full scope of this complex issue.

Having established diagnostic criteria to enable relevant sampling of women in clinical trials, consensus and its means of achievement need to be found to enable the assessment of treatment efficacy and suitable endpoints. To this end, regular research into the perception of the women involved in studies needs to be taken into account, an evaluation that is not always included (Lethaby et al., 2013).

As emphasised throughout this thesis, CPPD is a multifactorial health issue in terms of both symptoms and aetiology. The majority of research to-date in this area of women's menstrual health has been treated as single issues, the main ones identified being dysmenorrhoea, HMB and PMS. However, these issues can occur concurrently or in variable combinations in a single cycle or at variable frequencies over many cycles. The fact that not every cycle is affected to the same extent by the same menstrual problem(s) does not negate their impact on women's lives. Therefore, a better system of diagnosing CPPD as a whole entity is required. This would ideally encompass the most commonly experienced range of symptoms, their frequency and impact on women's lives, using measures that are both scientific and

subjective, quantitative and qualitative. A scoring system that acknowledges variable clusters of menstrual issues could be used to identify women's range of menstrual discomforts as a precursor to testing new treatment regimes.

8.6.1.2 CAM and CPPD research

The field of CAM research into CPPD is limited and much of it has been criticised for being of variable quality. One of the broader, initial issues to resolve, through worldwide research, is the standardising of the therapies and practices that constitute CAM (Fischer, F. H. et al., 2014). This would ensure comparability of data across cross-sectional studies. As was evident from the literature review in Chapter 2, women worldwide have used CAM to treat CPPD. The data derived from ALSWH, presented in Chapters 4 and 5, also indicated that women with CPPD were more likely to be using some types of CAM. This data provides a basis for more detailed research with increased clarity needed on many fronts. These include:

- specific information on which individual products, within the broad categories canvassed (herbal medicine, Chinese medicines and vitamins/minerals) were being used to treat which aspects of CPPD;
- women's qualitative and/or their quantifiable perceptions of the effectiveness of each CAM product or combination of products;
- whether conventional medicine had previously been used by them to treat this same issue;
- whether conventional medicine and CAM were used concurrently;
- what AEs, if any, were experienced; and
- whether there was professional oversight of the CAM used.

In conjunction with more in-depth observational research data, clinical trials are also needed to verify the efficacy and safety of CAM in treating CPPD. Clinical trials to-date on CAM generally lack scientific rigour and extensive, robust research is

required to scientifically corroborate the efficacy of therapies and practices, many of which are currently based on tradition alone. For CAM to contribute to improved healthcare for women with CPPD a proper evidence base is required, demanding quality research that passes scientific scrutiny. Botanical medicines used in clinical trials, as an example, have varied in dosage used and/or their extraction and manufacturing processes are often unclear, resulting in difficulties in interpretation of variations in clinical outcome (van Die et al., 2013).

At the same time, new research models need to be developed that take into account the individualised treatment approaches adopted in many CAM practices and proposed by CHPs as part of their future treatment strategies. These models should allow for the assessment of individualised combinations of CAM and conventional treatments as well. In the case of CPPD this would include research to identify the therapeutic gaps in CPPD treatment that could be addressed using CAM within individualised treatment. This approach is likely to require a level of co-operation between conventional and CAM practice using agreed protocols and research into the ways this can be achieved. The need for individualised treatment strategies to treat women with CPPD identified within biomedicine will require these new models in any event and must form part of the future vision.

A component of the shortage of good quality research into CAM is the lack of trained CAM researchers (Adams, 2008). A better understanding of the barriers to CAM professionals engaging in research and an exploration of how best to recruit students interested in pursuing CAM health research is also vital to extending the ability of relevant CAM clinical practice to be broadened.

Whilst it has can be inferred that women with CPPD themselves perceive a need for more treatment options the level of need, and their preferences in treatment, also need to be established. Cross-sectional studies and focus group research are suitable tools with which to gather this information. If there is a need found

amongst women with menstrual problems to include CAM treatment as an option, this would help guide health policymakers with their decisions on future health provision.

There is an understanding developing that CAM may have a role to play either as an alternative or supplementary treatment (Fischer, F. H. et al., 2014; Lin, Canaway, & Carter, 2015). An important aspect for policymakers in deciding whether to integrate CAM into the best practice for women's menstrual health, in addition to women's preferences, is an objective and robust assessment of CAM's clinical effectiveness and long-term cost-effectiveness in treating CPPD. Most importantly there is a need to research the safety of CAM, especially those that are ingested, like WHM, and to properly quantify the risks of AEs and/or interactions with standard conventional CPPD medicines.

8.6.1.3 Motivations

The adoption by women of CAM as part of their treatment and the recognition by policy-makers for the need to have a patient-centered, integrated approach including client involvement in treatment (Salamonsen, 2016) are aligned suggesting the time has come for a wider range of CAM to become part of women's healthcare. Currently, unregulated CAM modalities are likely to have valuable contributions to make to women's healthcare and the barriers to their inclusion within the healthcare framework needs to be examined.

At present only three CAM modalities are regulated in Australia, chiropractic, osteopathy and TCM (Wardle, J. et al., 2014). Even with statutory regulation only 60% of GPs make referrals to chiropractors and 23% to osteopaths, at a minimum of a few times per year (Wardle, J. L., Sibbritt, & Adams, 2013a). According to one survey, between 16% - 21% of GPs surveyed had actively discouraged the use of

these therapies (Cohen et al., 2005). To Improve women's healthcare options and their safe use of all medicines, CHPs need to be included in the discussion of CAM use for CPPD. Recent surveys also suggest that around 56% of CAM practitioners are making referrals to CHPs (Adams, Peng, et al., 2017; Fisher, C. et al., 2018), that would leave a possible 44% of CAM practitioners potentially excluding CHP input. There is some evidence that CHPs who practice CAM are more likely to receive GP referrals and that those GPs with greater knowledge or personal use of CAM are also more likely to refer to CAM practitioners (Wardle, J. L. et al., 2013a). Only around a fifth of GPs surveyed felt confident to be able to discuss CAM therapies with their patients although over 50% of them acknowledged that public demand for CAM was rising (Cohen et al., 2005). How to improve CHP knowledge about CAM would require surveys of frontline conventional practitioners as to the most effective means of reducing this deficit. Similarly, CAM practitioners lack of direct communication with, and low referral rates to, GPs is a poorly studied field but if barriers exist the reasons for them need to be explored in the interests of engendering a closer co-operation in healthcare.

As the recognized health providers in most countries, CHPs may feel that shared care with CAM practitioners would undermine their control in health matters or that the CAM workforce lacks an evidence base for their practice as well as the requisite level of training to allow for important health-related decision making (Jarvis, A., Perry, Smith, Terry, & Peters, 2015). On the other hand, the barriers that CAM practitioners perceive in communicating directly with CHPs may relate to their lack of understanding of conventional medical technology and/or knowledge gaps in medical matters. Whatever the reasons for this lack of mutual support, research is needed to examine the issues and ways to resolve them to allow all practitioners to reach a comfortable working relationship.

Surveys could be used to uncover potential barriers to achieving a better working relationship between the sectors and factors that would enable mutual respect. For

all healthcare practitioners, measures that would lead to a greater openness regarding the strengths, weaknesses and limitations in their areas of practice needs to be investigated for meaningful dialogue to occur. Co-operation amongst women's health providers through proper professional communication should ensure that women achieve the best possible health outcomes, a goal shared by all health practitioners.

From women's point of view, research is required to reliably measure their motivations and reasons for adopting CAM in CPPD treatment. It has been suggested that the choice of CAM may simply reflect the public perception that CAM has fewer associated AEs and greater safety profiles than that of conventional options (Fischer, F. H. et al., 2014). Research is needed to deepen the understanding of women' use of CAM for menstrual problems. Likewise, the attitudes and motivations regarding women's use of conventional medicine for CPPD treatment would help clarify their experience of its perceived benefits and disadvantages. This information would further aid healthcare providers to understand women's priorities in seeking treatment.

Cross-sectional studies have highlighted two further issues faced by many CAM users that need deeper understanding. One is the non-disclosure by the public of their CAM use to CHPs (Adams, Barbery, et al., 2013; Critchley et al., 2005; Sawalha et al., 2008), estimated at between 50% - 70% (Wiles & Rosenberg, 2001). The other is the concurrent use of both CAM and conventional medicine, probably in the absence of any professional oversight. Fear of a poor reception by CHPs to disclosure of CAM use has been cited in surveys as one main reason for non-disclosure (Robinson & McGrail, 2004). There may be other important reasons why women with CPPD may choose not to openly discuss their CAM use with their CHPs, a lack of transparency with important implications regarding treatment safety that urgently needs to be understood. Enabling open discussions between women and their health care providers would lead to practitioners having a better

understanding of which treatments have been effective and at the same time engender a more supportive atmosphere for women, improving their ability to select treatment strategies that best align with their needs and perspectives.

Cross-sectional survey data reported in Section 2.3.4 also highlighted low levels of treatment-seeking behaviour amongst women with CPPD. Health policymakers need to ascertain the magnitude of these unmet health needs as well as the true level of self-treatment that exists but remains unmonitored. Lack of adequate treatment for CPPD issues increases the burden borne throughout society, from women to the state. Self-treatment raises issues of adequate, safe and appropriate control of CPPD.

8.6.1.4 Information sources

As greater knowledge of CAM amongst CHPs encourages better co-operation to shared healthcare with CAM practitioners (Gordon et al., 1998; Wardle, J. L. et al., 2013a), therefore surveys of CHPs knowledge of CAM needs to be ascertained. Understanding the sources of CHPs information about benefits and disadvantages of CAM in CPPD treatment also needs to be examined in order to increase their access to reliable research data. Some knowledge has derived from personal or family member use of CAM (Wardle, J. L. et al., 2013a) whilst academic and/or professional sources are also providing CHPs with CAM information. Research into ways of achieving wider dissemination of scientific research into CAM is needed as mainstream journals may devote limited space to CAM research. Systematic reviews, for example, may not be a defining source of information in CHPs decision-making regarding CPPD treatment given that the Cochrane Reviews of the use of TCM for treating dysmenorrhea assessed as promising (Zhu, Proctor, Bensoussan, Wu, & Smith, 2008) and OCPs as having limited evidence of improving pain (Wong, C. L. et al., 2009) are not reflected in standard conventional practice. The

publication of better quality research into CAM will help but research into where CHPs who deal with CPPD access their information can guide relevant dissemination of this research.

Public demand and interest in CAM is also known to be influential in CHPs' interest in CAM (Gordon et al., 1998) and it would be of great value to survey CHPs about the level of interest shown in CAM by women with CPPD they encounter in their clinics. From the survey amongst CHPs in a Californian Health Maintenance Organisation (HMO), gynaecologists were amongst those practitioners most interested in CAM, with PMS and other conditions for which conventional medicine was deemed inadequate, their main reasons for wanting CAM to be made available within the HMO (Gordon et al., 1998). As potential drivers for the inclusion of CAM into conventional healthcare, further research is needed to determine how general these same attitudes are in other countries and within different medical settings. Surveys are also needed to increase the understanding of potential barriers that may be faced by CHPs in referring women to CAM practitioners for CPPD treatment, as barriers are perceived to exist (Wardle, J. L. et al., 2013a).

CAM practitioner information on research and evidence for their modalities in treating CPPD, and that of other CAM and conventional medicine, also needs to be explored to ascertain whether this is an area presenting barriers to better co-operation between them and other health professionals, affecting their ability to provide effective, integrated solutions for women. CAM practitioners understanding of when to refer women with menstrual problems on for more detailed investigation and their levels of confidence, methods of diagnosis and measures of treatment outcomes in dealing with CPPD are areas that require careful research. Any apparent deficiencies in safe practice can then be professionally addressed, raising the confidence with which CHPs, women and health policymakers can incorporate CAM practices into women's healthcare.

Research into which factors are guiding women to choose any particular CAM to treat CPPD would provide a greater understanding of the most influential sources of information, and the quality of that information. This, in turn would help guide health policy managers in selecting the most appropriate information platforms. From the literature review presented in Chapter 2 it is apparent there are limited data currently available about the sources that are most influential in guiding women to use CAM to treat CPPD, and this data is over a decade old now (Chen et al., 2006; Domoney et al., 2003a). In 2003, only 1% of women used the internet to access treatment options for PMS (Domoney et al., 2003a), a situation that is likely to be out-of-date with current practice. The quality of internet information is very variable and determining which of the sites women are relying on for this information is important to gauge the quality of their knowledge of both CAM and conventional medicine.

8.6.1.5 Scope of future research

The scope of research into CPPD treatment needs to be extended to also include their duration and costs, women's perceptions of their advantages and disadvantages (including reporting of AEs), as well as their long-term outcomes. This latter issue has not been well-established even for currently used conventional treatment (Lethaby et al., 2015; Lopez, Kaptein, & Helmerhorst, 2012).
From the literature review in Chapter 2, it is apparent that the most current survey-based research into CAM use by women with CPPD has been undertaken in non-Western countries. Australian research is minimal, but the most detailed study, conducted in 1997 (Campbell, E. M., Peterkin, O'Grady, et al., 1997), used a single regional sample recruited from women visiting medical practices, making such findings very difficult to generalise. The extent of CPPD in Australian women of reproductive age, its manifold costs and the effective treatments of all types

women are employing, if any, in treating CPPD is a necessary area of future research.

More information is also needed into longitudinal changes associated with the prevalence of CPPD and the effects of associated treatment strategies. Data in Chapter 5, based on the ALSWH surveys, has initiated this investigation, but more detailed information would help to ensure future health provision is available to meet women's health needs. Included in this research should be a component of relative costs associated with various treatment strategies, the geographical spread of key health practitioners and how best to allocate funding to ensure the most efficient mix of care is available throughout the country.

8.6.2 Research funding and support

The research structure to enable economic evaluations of CAM is still largely minimal within individual CAM groups (Ostermann, Krummenauer, Heusser, & Boehm, 2011). At the same time as the public are turning to CAM, very few of the national resources for medical research within countries are being channeled into CAM research, one reason suggested for this is the low status in which CAM is held by conventional medicine (Kooreman & Baars, 2012). According to Fischer et al. the UK Clinical Research Collaboration estimated only 0.0085% of the UK budget for medical research was spent on CAM (Fischer, F. et al., 2014). The dichotomy presented by the lack of committed funding for CAM research is that whilst there is likely to be a great need for it to complement better healthcare in the future the medical system is reluctant to use more of these services without corroborative scientific evidence.

Other countries have begun allocating and planning for better funding and procedures for CAM (Fischer, F. et al., 2014; Fisher, P. & Ward, 1994; Institute of

Medicine, 2005) that could help facilitate policy changes in Australia. Research into funding sources is also needed to increase those that are made available from government. Currently, the CAM commercial industry is becoming increasingly profitable and ways to enable them to contribute to independent research should be sought.

In addition, the current Australian higher education institutions teaching CAM lacks the research infrastructure and is, at any rate, focused on professional qualifications at the cost of producing confident professionals who can undertake the type of CAM research that is essential to its mainstream acceptance (Steel et al., 2015). An understanding of how this can be remedied is needed to redress the shortage of CAM professionals competent to participate in good quality and necessary research.

At present, there is little incentive or capacity for research amongst CAM teaching staff, a situation that could change through adequate funding (Lin, Canaway, & Carter, 2015; Steel et al., 2015). Research is needed to understand the hindrances that exist to developing a viable CAM research workforce from the perspective of academic institutions and the recruitment of prospective students. Research is also needed into the best way to develop sustainable career pathways for CAM researchers.

The development of PBRNs is a valuable resource with which to extend CAM research. Barriers to recruitment of members of CAM professional bodies to PBRNs to increase participation in research projects also needs to be examined. CAM professional bodies also need to be canvassed for ways in which they can encourage and support their membership to contribute to research and to engage in the development of well-designed research projects.

8.6.3 Research models

Whilst the CAM industry itself is reluctant to accept conventional research designs unable to accommodate the individualised nature of their practices (Leach, M. J. et al., 2018), rigorous research is necessary if CAM is to gain traction as a viable treatment for CPPD. Clinical trials on the efficacy of single treatment strategies and using standardized definitions are still needed, but a new paradigm is called for which is scientifically rigorous enough to give credence to CAM whilst maintaining its unique treatment approach that accommodates clients' real-life situations and is concerned with the effectiveness of treatment (Fischer, F. H. et al., 2014). The difficulty of applying RCTs to CAM was acknowledged by the USA National Health Council however they recommended that CAM be subject to the same evidence base as conventional medicine (Institute of Medicine). New models of health research are emerging that focus on individual outcomes and treatment effectiveness, factors recognized as more important than the efficacy of a single agent, to healthcare decision-making even within conventional health practice (Fischer, F. H. et al., 2014). These models are more compatible with CAM practice than RCTs and should provide acceptable solutions to the concerns of CAM professionals in complying with the need for evidence-based medicine.

One model is that on which this thesis is based, PH/HSR, which is concerned with a broader view of healthcare using multidisciplinary strategies that acknowledges social, financial and organisational factors as well as individual motivations for healthcare use, and the wider impacts on families, communities, health professionals and policy-makers. Another model is the person-focused treatments currently enabled through gene mapping and molecular biology, that of Whole Systems Research (WSR). It has been defined as "approaches to health care in which practitioners apply bodies of knowledge and associated practices to maximize the patients' capacity to achieve mental and physical balance and restore their health, using individualised, non-reductionist approaches to diagnosis and treatment." (Ritenbaugh, Verhoef, Fleishman, Boon, & Leis, 2003; Verhoef et al., 2005). The

central tenets of treatment, the individual's well-being and the relationship between the individual and the practitioner, aligns well with CAM practice.

Finally, for health providers, Health Technology Assessment (HTA), represents a worldwide drive to rationalize health costs and needs and is defined as "a multidisciplinary field of policy analysis which studies the medical, social, ethical, and economic implications of development, diffusion, and use of health technology". The rationale behind HTA is to better allocate government funding for an ever-expanding need for healthcare and its goals are to optimize health outcomes and resources to achieve cost-effective health strategies that are also clinically effective and safe. HTA takes into account the impending strains on future health care delivery (Ju & Hewson, 2014).

That the public values CAM is strongly indicated by their willingness to pay for it themselves, but there is also a recognition amongst conventional health providers that CAM has a place in healthcare. By integrating conventional and CAM services, the public would benefit by having options that align with their preferences, the best and safest healthcare available and the full cooperation and knowledge of all healthcare providers without cost being a potential barrier to accessing these mixed modalities (Lin, Canaway, & Carter, 2015). Future research, therefore, needs to embrace the real world of CAM treatment as well as conventional clinical trials (Fischer, F. H. et al., 2014). Future healthcare must have at its heart a willingness on the part of all involved to work together to provide an integrated service that has the best outcome for its users.

8.7 Chapter summary

This chapter has looked at the significance and information to have emerged from the original research comprising this thesis as well as its limitations and strengths.

The future research needs for the role of CAM in the treatment of CPPD has also been discussed.

9. Conclusion

There are four main conclusions to emerge from this body of original research. The first is that there is a widespread burden endured by women with CPPD and the impact of this burden permeates beyond the women themselves to affect their families and the wider society in terms of care, cost and lost function. The current clinical gaps in the conventional therapies offered in Western countries to effectively treat what can be chronic cyclic, menstrual problems requires new approaches to treatment that go beyond the biomedical model.

Secondly, given the lack of suitable conventional therapies and the potential protracted nature of CPPD problems that could involve long-term medication, women have sought solutions in a variety of CAM, often through self-prescription and with no professional oversight. Women's self-prescription with CAM raises serious concerns regarding issues of both efficacy and safety, heightened by the evidence that both CAM and conventional medicine are frequently used concurrently. The impact on women's health and quality of life due to the unsupervised treatment of CPPD, and the extent to which it is occurring is currently unexplored but has important ramifications for those within the healthcare sector.

The third significant result from the thesis is that CAM appears to have benefits in the treatment of CPPD, at least from the perspective of the users and WH providers involved. It is important to clarify that this conclusion is based directly on the reported perceptions of women, WH practitioners and through clinical data albeit of mixed quality. However, there are also indirect indications, from data published in the literature, of CAM's relevance to CPPD treatment based on the recommendation of CHPs to women to use either particular CAM products or to consult CAM practitioners. The recommendation from CHPs for women to consult CAM practitioners for CPPD is occurring mainly, at present, without formal referrals. From both the literature and data gathered for this thesis, WHM, and its

practitioners, have provided enough preliminary indications of safety and efficacy to warrant further robust research into their potential contribution to extending the current treatment options available for CPPD.

Finally, direct data from the perspective of WHs surveyed for this thesis regarding inter-referral practices, and the evidence in the literature of women's treatment-seeking behaviour, a lack of communication has emerged amongst women, CHPs and CAM practitioners. There is growing need to provide an integrated and co-ordinated system of healthcare that would ensure safe and effective treatment is available for improving women's health. Conventional gynaecology authorities, according to the scientific literature, are moving towards individualizing treatment for CPPD and are aware that CAM could be part of this strategy yet appear reluctant to formally advocate such use. From data obtained for this thesis, Western herbalists, as representatives of CAM practitioners, strongly believe that their therapy has high efficacy in treating CPPD, but rigorous testing is essential to give scientific weight to their confidence. Health policymakers act as the overseers of a system that could provide safe, cost-effective and acceptable solutions for women with CPPD. With good quality evidence of CAM's effectiveness, policymakers could strongly encourage the conventional and CAM sectors to operate cooperatively in the best interest of the women who need and use these various health services.

The research outlined in this thesis has laid a foundation for understanding the extent of CPPD and CAM use by women with CPPD as well as examining the types of CAM that women appear to have found beneficial. It has also provided a unique perspective on the perceptions of a group of professionals in a sector of the CAM industry, WHs, who are often consulted by women who are experiencing CPPD whether that was their presenting problem or not. This thesis represents an initial exploration of an important area of women's health and their treatment options, and in so doing has exposed the gaps in knowledge and inconsistencies in research methodology that requires to be addressed through rigorous research in the future.

It has also highlighted those research areas that require future attention in order to extend the current limited knowledge of the factors that contribute to women's choice of CPPD treatments and the motivations, attitudes, hindrances and facilitators amongst those involved in women's healthcare that could enable CPPD sufferers to choose from a wider range of safe, effective and integrated treatments.

10. References

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11. Appendices

Appendix 1

A critical review of complementary and alternative medicine use by women with cyclic perimenstrual pain and discomfort: A focus upon prevalence, patterns and applications of use and users' motivations, information seeking and self-perceived efficacy.

ABSTRACT:

Introduction: Complementary and alternative medicine (CAM) is used for treating cyclic perimenstrual pain and discomfort. This critical review examines women's reported CAM use, its perceived effectiveness and information relating to women's attitudes, behaviours, motivations and patterns of CAM use in its treatment.

Material and methods: An extensive search of the main medical databases EBSCO, CINAHL, Medline, AMED and SCOPUS, as well as additional hand searches, was conducted. Papers included were confined to those that had been peer-reviewed, written in English and containing original research into CAM use for cyclic perimenstrual pain and discomfort amongst adult women.

Results: CAM, particularly herbal medicine, nutritional supplements and massage, is widely used for a range of cyclic perimenstrual pain and discomfort symptoms. A large number of CAM modalities are adopted, often simultaneously and with little professional oversight. Women's assessment of efficacy of different CAM modalities is positive, though the majority of users are self-prescribing apparently without professional guidance. Although the uptake of CAM for cyclic perimenstrual pain and discomfort is wide-spread, little empirical data is available regarding which women are using CAM, their motivations for doing so and importantly the sources via which women receive information about CAM.

Conclusions: This review highlights the extensive use of (often self-prescribed) CAM in a number of countries to alleviate the widespread symptoms of cyclic perimenstrual pain and discomfort. An understanding of all health care utilisation by women with perimenstrual pain and discomfort is vital to help ensure safe, effective and coordinated health care that can lead to optimal patient outcomes.

Keywords: perimenstrual **pain,** perimenstrual **discomfort, complementary and alternative medicine.**

Abbreviations: CAM, complementary and alternative medicine; CHM, Chinese Herbal Medicine; CPPD, cyclic perimenstrual pain and discomfort; PMDD, premenstrual dysphoric disorder; PMS, premenstrual syndrome; TCM, Traditional Chinese Medicine, U.K., United, Kingdom; U.S., United States.

Key Message: The prevalence of perimenstrual pain and discomfort is high worldwide however the predominant treatment strategies are unsupervised by professional health providers. Complementary and alternative medicine although frequently used has undocumented benefits and risks.

Introduction

Cyclic Perimenstrual Pain and Discomfort (CPPD) encompasses symptom clusters that recur in the premenstrual or luteal phase of the menstrual cycle (known as premenstrual syndrome or PMS) as well as those that may continue, or begin, during menstruation itself such as dysmenorrhea [1]. Symptoms may be predominantly physical (dysmenorrhea, headache, nausea, fluid retention, bloating, painful or tender breasts), affective (mental or emotional), or some combination of both [2], are related to cyclical hormone changes, may involve one or many symptoms, may vary from one cycle to the next and appear to have no single etiology [2-4].

CPPD is widely experienced by women across cultures, at some time during their reproductive life, with prevalence rates of women experiencing at least one CPPD-related symptom assessed as between 80 - 97% [4,5]. Whilst not all symptoms necessarily require treatment those women with moderately severe to severe symptoms, occurring in 40% [4] and between 2-10% [2,5] of women respectively, will probably seek help. A lack of both definitional clarity and understanding of underlying mechanism(s) [3] have resulted in the absence of a satisfactory treatment strategy [3]. It is possible that attitudes to CPPD amongst different cultures affect not only the experience of these symptoms but also the adoption of certain treatment-seeking behaviours [6]. Despite CPPD symptoms potentially resulting in varying levels of discomfort and interfering greatly with women's ability to work and lead a normal life at times during their cycles, many researchers have reported that with less severe CPPD symptoms women often do not seek professional help [7-17].

Current conventional treatments for CPPD include mainly hormone therapies, anti-depressants, analgesics and anti-inflammatory drugs, symptomatic drug regimes such as diuretics and, less frequently, surgical interventions such as oophorectomy [2,18,19]. The variety of conventional treatments for CPPD, over 300 to date, range from conventional drugs through to nutritional and psychological approaches. All available treatments are recognised as not being wholly applicable or satisfactory for all women nor as necessarily providing long term solutions due to the unknown but likely mixed etiology of symptoms [3,19].

Meanwhile, the use of complementary and alternative medicine (CAM) – comprising a range of diverse health care practices and products not traditionally associated with the medical curriculum or medical profession such as herbal medicine, acupuncture and massage – is high [20,21] , particularly amongst women [22,23]. There appears to be considerable use of CAM amongst women with CPPD [9,10,13-15,24-30], and a growing acceptance amongst medical professionals of the possible suitability of some CAM modalities for their treatment particularly herbal medicine, supplements and acupuncture [31,32].

Whilst there are clinical trials showing efficacy of some CAM for treating aspects of CPPD such as acupuncture in treating dysmenorrhea [33] and *Vitex agnus-castus* (Chaste tree berry) for premenstrual syndrome [34] there is a need for further efficacy research. Moreover, while initial work provides some baseline data on CAM use for CPPD, this topic has till now been somewhat uncoordinated and *ad hoc* [2,4]. There is currently no critical or systematic overview of this sub-field of empirical literature, a situation made more pronounced and significant by the fact CAM use for CPPD raises challenges for those looking to provide and manage safe, effective care for affected women. There is a gap in health care providers' knowledge as to 'best practice' in treatment and an unknown risk regarding women's concomitant use of all therapies and the extent to which women fully disclose all treatments to their health carers.

In direct response to this identified research gap, this paper reports findings from the first critical review of CAM use amongst women with CPPD with a focus upon prevalence of use, those using CAM as well as self-perceived efficacy, motivations and information seeking behaviour of users.

Methods

In order to identify the contemporary literature reporting on CAM use for CPPD database searches of EBSCO, CINAHL, Medline, AMED and SCOPUS were conducted, using the following keywords "problem bleeding" or "abnormal uterine bleeding" or "abnormal vaginal bleeding" or "dysfunctional uterine bleeding" or "atypical uterine bleeding" or "inter*menstrual bleeding" or "excessive uterine bleeding" or "excessive vaginal bleeding" or "excessive menstrual bleeding" or "menstruation disorder" or "menstruation disturbance" or "irregular bleeding/periods" or "irregular menstrual cycles" or "irregular menses" or "prolonged menstrual bleeding" or "prolonged uterine bleeding" or "prolonged periods" or "severe acute uterine bleeding" or "severe acute vaginal bleeding" or "dysmenorrh*ea" or "menstrual dysfunction", "polymenorrh*ea" or "oligomenorrh*ea" or "hypermenorrh*ea" or "menometrorrhagia", "uterine/vaginal h*emorrhage" or "metrorrhagia" or "painful periods" or "menstrual pain" or "irregular menses" or "frequent menses" or "menorrhagia" or "heavy menstrual bleeding" or "abnormally long or heavy menses" or "metropathia h*emorrhagica" or "increased menstrual loss" or "cycle related changes" or "pre*menstrual" AND "CAM" or "complementary medicine" or "complementary therapy" or "alternative medicine" or "alternative therapy" or "herbal medicine" or "herbal therapy" or "acupuncture" or "natural medicine" or "naturopathy" or "homeopathy" or "traditional Chinese medicine" or "osteopathy" or "nutritional therapy" or "nutritional medicine" or "Ayurvedic medicine" or "massage therapy" or "aromatherapy" or "chiropractic" or "Reiki" or "hypnotherapy" or "spiritual therapy" or "integrative medicine" or "unorthodox medicine" or "unconventional medicine" or "nutritional supplement" or "herb".

The search was confined to papers in English published in peer-reviewed journals and which reported new, empirical data regarding CAM use amongst adult female populations with any form of CPPD. In line with the aim and focus of the review, manuscripts which reported results from clinical trials (including randomised controlled trials) or case histories as well as those papers constituting reviews, letters or commentaries were excluded from the search. An additional hand search was undertaken in a selection of international peer-reviewed journals (*Acta Obstetrica et Gynecologica Scandinavica*, *BMC Women's Health*, *American Journal of Obstetrics and Gynecology* and *Journal of Clinical Nursing*) which were considered leading journals in this area of health care to add confidence that all relevant international publications meeting the search inclusion criteria were identified. Finally, Google Scholar was searched utilising a number of keywords from the extensive list above as an additional check.

Quality appraisal

To appraise the quality of papers identified for review, a quality scoring system based on previously described parameters used to assess prevalence studies of CAM use was employed [35]. Details of quality scoring are provided in Table 1. Two authors employed the quality appraisal scoring system to assign a systematic, quantitative value to the studies separately, compared their results and resolved any discrepancies by discussion. The quality scores of papers are provided in Table 2.

Results

The initial search identified 7,006 records of which 113 papers were screened and from these 44 empirical studies met the selection criteria for inclusion in the review. Thirty-six of the included papers report cross-sectional studies that specifically relate to the use of CAM for CPPD treatment and eight other papers relate to cross-sectional surveys reporting CAM use results from more general populations (including and/or beyond women) which have reported on

women with CPPD as one of a number of many other research interests. General information from each of the 44 articles is presented in Table 3.

Analyses of the extensive time period of our search (1986 to 2014) reveals the exponential growth in empirical research focusing upon this topic over recent years - indeed the last seven years has produced as many papers reporting research on women's use of CAM for CPPD symptoms as all research on this topic over the previous 22 years (1986-2007). Papers included in this review that are specific for CAM use in CPPD were conducted in Australia (3), U.K. (4), U.S. (9), Ethiopia (1), New Zealand (1), South Korea (1), Hong Kong (1), Japan (2), Turkey (2), Pakistan(1), Taiwan (3), Jordan (2), Egypt (1), South Africa (1), Nigeria (1), Brazil (1), India (1) and one tri-nation study involving U.K., U.S. and France.

Prevalence, patterns and applications of CAM use

Amongst all review papers, 32 focussed specifically on CPPD symptom(s) which included CAM use prevalence [7-17,24-30,36-49]. The CAM use timeframes surveyed were variously reported as current/most recent cycle [7-9,11,41,44], last three months [15,17,29], last 6 months [14], last 12 months [10,28,37,39,48]; a 5-year period [36]; and 'ever use' [8,15,24-26, 44,48]. However as shown in Table 3, 13 of the studies reviewed, failed to specify the time frame in their empirical work. Excluding data for 'ever use', 29 studies reported prevalence of CAM use between 0.9-98.4 % (mean=32.8%, median = 32.0%) [7-17,27-30,36-49] when applying the broadest definition of CAM including self-treatments and home remedies. By comparison CAM use prevalence rates for all surveys post-2008 had a mean=34.4% and median=34.3% and pre-2008 these were mean=30.4%, median=21.0%. Reported prevalence rates for CAM 'ever users' ranged from 22.4-92.0% (mean=63.0%, median=74.0%) [8,15,24-26,44,48].

Reported prevalence of use of vitamin/mineral supplements, including vitamin B_6, ranged from 9-34% (mean=23.1%, median=24.7%) [8,9,26,39] in large studies (n > 499), from 4.3-62.5% (mean=22.2%, median=17.0%) current use [14,15,44,47,48] and 34.0-92.0% "ever use" [15,24,44,48] in those of smaller sample size (n< 500). Other CAM in this category reportedly used by PMS sufferers included Evening Primrose Oil (EPO) [8,11,15,24,44,48], calcium [39], magnesium [24,39] and zinc [24].

From surveys targeting CAM use and CPPD, we grouped those reporting herbs, traditional medicine, Chinese Herbal Medicine (CHM) or Traditional Chinese Medicine (TCM) together as herbal medicine. In large sample-sized studies, prevalence of use ranged between 0.5-69.7% (mean= 31.1%, median=35.0%) [10,25-28,36,38,39,41] and in small sample studies from 7.0-37.3% (mean=20.6%, median=20.7%) [14,16,29,30,43-45,47]. User-prevalence for CHM/TCM had mean and median values of 28.8% and 22.4% respectively [14,25,27-29,36,41]. Herbs identified were *Si-Wu-Tang* [41], *Zhong-Jing Tang* [41], *Dang-Qui-Shao-Ya-San* [28,36,50], St. John's wort [39,44], ginger [28,41] and cinnamon [47]. Herbal medicine may be part of treatment described as hot drinks/tea and home remedies but were not included in our herbal medicine calculations.

Other CAM modalities reported for CPPD use in reviewed papers (not all with prevalence of use data) were homeopathy (range 0.9-14%) [12,27,38,44], acupuncture (range 0.1-31.0%) [8,26,27,43,44], massage (range 1.4-61.0%) [9,13,15,16,27,39,42,43,47], mind/body therapies e.g. yoga and meditation (range 0-9.5%) [8,9,27,39,44], aromatherapy [44], special/hot drinks/tea/coffee [10,13,14,47], faith healing [8] and Ayurvedic medicine [17].

CAM practitioners in countries where conventional medicine predominates were consulted by 4.0-12% of women in reviewed surveys [8,15,46] and a 2002 U.S. study reported premenstrual dysphoric disorder (PMDD) sufferers were more likely to consult CAM practitioners than those with less severe PMS [51]. However, the 1991 PMS U.K. survey found 22.0% of women

consulted both medical and "non-medical" providers [8] and 7.1% of Taiwanese women recorded simultaneously using conventional and CAM for CPPD [41].

Two PMS surveys of 'ever use' reported that at least 20% of respondents had tried five or more treatments [15,46] and attendees at PMS clinics recorded they had tried one to 12 CAM (mean=3.2) [44] and a median of four self-help remedies (including CAM) [24]. Meanwhile, a comparative survey across the U.S., U.K. and France, of all non-prescription medicines used (CAM and non-CAM) to treat PMS reported only U.K. women mentioned CAM [11]. In four population-based studies examining broad CAM use (beyond CPPD) and included in the review, irregular bleeding and dysmenorrhea are identified as among the five most common reasons for CAM use [36,50,52,53].

The reviewed literature identified various CPPD symptoms in which women used CAM. As shown in Table 3 two papers specifically surveyed general CPPD and CAM, most of those remaining referred to dysmenorrhea and PMS. Of all reviewed papers 21, (see Table 3), represent data from countries retaining a strong culture/reliance on traditional medicine. Papers surveying dysmenorrhea included six small studies (n=23-616) with age range 16 – 28 years [12,14,16,28,30,55] , the remaining seven spanned menarche-55 years of age [7,25,29,36,38,41,42] of which all but one was based on sample sizes of 500 or more (n= 274-23118). In the very large sample of dysmenorrheic, Taiwanese women 53.4% used mostly practitioner-prescribed CHM [36]. However, a Japanese prospective study noted CAM was used equally by all women whether or not they experienced dysmenorrhea [7]. Chia et al. (2013) found pain in the middle of menstruation increased the likelihood that young Hong Kong women would resort to 'non-pharmacological' self-treatments than if pain occurred premenstrually or at either end of the period [14].

CAM treatment of PMS was reported in fifteen reviewed papers, three failed to define symptoms [24,44,46], and the remaining surveys, (see Table 3), referred to both affective and physical symptoms. Age ranges for the majority of these surveys, irrespective of sample size, fell between 18-43 years (range 15–64 years). Data collected by Gold et al. suggested women with physical PMS symptoms were more likely to use CAM than not [37]. However, two studies surveying PMDD sufferers reported these women's higher use of CAM therapies [39] and visits to CAM practitioners [51] compared to those with milder PMS symptoms.

Additionally our review identified papers in which CAM use was associated with endometriosis [29,49] and its associated leg pain [43]; pelvic problems (pain, pressure and dysfunctional uterine bleeding) [26], fibroids [29,40,45,58], menstrual problems including irregular cycles in younger women [17], menorrhagia [59] and mastalgia (mostly, but not exclusively, cyclical) [10]. With increased symptom severity, women's reported use of medication, including CAM increased [14,15,38,39]. Tariq et al. (2009) found CAM use was more likely if symptoms resulted in prolonged time off work [38] and greater symptom frequency in Cheng and Lin's sample increased CAM use [28]. Meanwhile newer patients attending a conventional PMS clinic in the U.K. continued CAM use but after more than five years attendance were likely to cease its regular use [44].

Data is scant and inconsistent in the reviewed papers, regarding age, CAM use and CPPD. From the large Taiwanese database women aged 21-30 years were more likely to use TCM than older or younger age groups [36] but the survey of 15-39 year old South Korean women suggested age was irrelevant with just over 20% of all women choosing to use CHM [25]. In the U.S., Sternfeld et al. (2002) reported, CAM use was higher amongst older women with PMS [39] but for women with fibroids younger women were greater CAM users according to Borah et al. [40]. Age did not determine how many CAM therapies women attending a PMS clinic reported trying [44].

Further reported profile details of women using CAM for CPPD was limited in reviewed papers, providing only brief information with regards to ethnicity, lifestyle factors, socio-economic and health status. The Taiwanese dysmenorrhea study by Pan et al. (2014) of 23,118 women found CAM use was higher amongst lower income women [36]. Of 12 tertiary students studies (majority aged 18-30 years) into medication in CPPD, three indicated CAM (including non-pharmacological treatments) were those most used [10,14,41], eight indicated that they were amongst those most commonly used [13,16,17,28,30,38,42,47] with only the 1991 South Africa survey reporting very low CAM usage [12]. Race/ethnic-specific data was limited to U.S. surveys where the highest CAM use for CPPD was found amongst white women [37,39,58]. Sternfeld et al. (2002) in U.S. reported CAM use for PMS was associated with women having a comorbidity and those who undertook regular, exertional exercise [39] whilst Australian research identified non-vegetarians who experienced lower levels of CPPD were also less likely than vegetarians and semi-vegetarians to have consulted a CAM practitioner [60].

Self Perceived Efficacy, Risk and Safety

There was variation of reported efficacy measured across different CAM modalities within studies but maximum self-perceived efficacy ratings (including registering effectiveness, satisfaction or improvement) for CAM in treating CPPD symptoms were generally high. Ratings reported were 33% -97% for PMS sufferers [8,9,24,27,44,48], 93-99% for dysmenorrhea [14,28] , 79% for endometriosis [43] and 27.7% for pelvic discomfort [26]. However the reported number of side-effects experienced or symptom-worsening which women associated with CAM use was considerably less than for conventional medicine [24,26]. Dissatisfaction with or finding CAM 'unhelpful', ranged from 14-69% where reported [8,44,48]. Meanwhile, women's rating of CAM practitioners were limited to two PMS-focused studies where of those women who consulted a particular modality the recorded maximum satisfaction was 74.6% with regards to homeopaths [8] and 50% for osteopaths [46].

In each of a number of studies reviewed, over 50% of participating women with CPPD believed their use of CAM was satisfactory or very satisfactory specifically for vitamins/supplements for pelvic discomfort [26], dysmenorrhea [14] and PMS [9,15,44] (vitamin B_6 especially for affective symptoms [9]); herbs for pelvic discomfort [26] and dysmenorrhea [14,28]; acupuncture for pelvic discomfort [26], PMS [44] and endometriosis leg-pain [43]; homeopathy for PMS [27,44]; mind-body/yoga for PMS [9,27]; and massage for endometriosis leg-pain [43] and PMS [9,15]. A New Zealand survey reported that the severity of symptoms did not appear to influence PMS sufferers' perceived treatment efficacy regarding their CAM use [9].

In the U.S. study on treating pelvic problems, Kupperman et al. (2007) found women with a lower income and educational status and those of African-American origin reported greater satisfaction levels, than either white or Asian women, for CAM and that self-rated satisfaction increased with the fewer conventional medicines and more CAM treatments used, the more effectively symptoms resolved, and with better mental well-being [26]. Within a focus group conducted in Australia, participants felt CAM's effectiveness for endometriosis ranged from helping temporarily to providing a "radical improvement" [49].

Communication and information seeking of CAM users

Detailed information/advice about CAM use for PMS as reported by Domoney et al. (2003) came from a number of sources including friends and/or family, media, internet and medical personnel [44]. Interestingly, 29% of women in this study reported their CAM information as sourced from medical practitioners [44]. The focus group consisting of 16 to 19 year-old Taiwanese women from Kaohsiung who used self-care strategies to manage dysmenorrhea indicated their mothers' directed their use of Chinese herbs to correct energy deficiencies, "regulate the uterus" and "cleanse the body" [55].

Motivations for using/not using CAM

Whilst motivation for not using conventional medicine to treat CPPD symptoms was indicated in eight studies included in the review [11,16,29,40,45,49,54,59], none reported on women's reasons for choosing CAM. Four focus group studies, two from Australia and one each from UK and Taiwan, canvassed the experiences and thoughts of women across a range of ages and mainly suffering one aspect of CPPD to provide more detailed attitudinal data for CAM use in their treatment [49,54,55,59]. Motivations for using CAM expressed by participants of an Australian focus group where 60 of 61 had adopted CAM in treating endometriosis were to enable them to gain control of their situation, be drug free, avoid surgery and 'get off the medical roundabout' [49]. Cost was however cited as a difficulty by this group in using CAM [49]. Whilst the other Australian focus group of sixteen 30-50 year old women with menstrual problems expressed "widespread acceptance of alternative natural remedies", taking pills "for pain relief weren't the only answer" and a preference for a "natural remedy" [54]. Some Taiwanese young women believed medicinal herbs would reduce dysmenorrhea next menstrual period [55].

Discussion

This article provides the first review of international studies of CAM use by women with CPPD problems. The analyses of the last 29 years of empirical study on this topic reveals a number of significant findings that impact on and have implications for future practice and policy.

Data from 14 out of 21 [9-17,25,27,28,30,37-39,41,42,46-48] of our reviewed papers, irrespective of cultural background, recorded prevalence rates of CPPD of 80% or more, supporting its very high prevalence generally reported in the literature [1,4,5]. Variation in these rates is likely to be exacerbated by the lack of consistent definitions and questioning regarding frequency and severity of symptoms. There are many general studies of CAM use confirming its uptake has increased throughout the world, especially amongst women [22,23]. That this increase can be related also to the treatment of CPPD in high income countries, is supported by the fall, in both the U.S. and U.K., of medical prescriptions for CPPD identified in the 1990s [18,19]. Indeed as far back as 2002, Wyatt et al., reported the unexpected prescription-rate drop even as there was increasing acceptance of PMS in the UK, leading them to speculate this may be because women increasingly turned to CAM [19]. The fact that in our review the last seven years has seen as much study into this subject as was reported in previous decades tends to add support to this interpretation. However, since 2008 interest in CAM for CPPD has largely been explored in countries where traditional medicine practices have been maintained, the majority of the recent surveys (18 out of 21) having been conducted in African, Far and Middle Eastern countries. We nonetheless found studies supporting CAM use in Western countries where "ever use" of CAM by women with PMS shows high user prevalence of 74%-92%.

Whilst reported strategies in the review papers reflect some cultural nuances they show considerable use is being made of CAM to treat CPPD problems. Not only are a large range of CAM treatments used, but multiple CAM appear to be used concurrently [8-10,14-17,24,26,28,41,43,44,46-48,57]. Possible explanations for increasing adoption of CAM are suggested by focus group members who emphasised preferences for 'natural' treatments and to help them wrest back control of their own health. The investigation into increased CAM use remains woefully unexplored, but much needed, to ensure its safe and effective use in the future. The established high need for effective treatment coupled with a lack of reliable current information highlights the difficulty for informed guidance in future health policy and practice worldwide in treating CPPD.

Our review also provides good evidence that a large proportion of women with CPPD choose not to consult any health professional for help. Lack of consultation has been noted by other authors, with suggested reasons ranging from not wishing to 'medicalise' a natural process, acceptance of CPPD as 'normal' or because of the perception of ineffective available treatments[1,3,18,19]. Therefore, it is extremely likely there will continue to be increasing use of CAM for CPPD through self-prescription. The motivation for not seeking professional CAM help remains unexplored but higher levels of self-prescribed CAM compared to professional CAM consultation is not new [22,61] and may be an economic measure or the perception that CAM is natural and therefore safe [57]. Indeed reviewed studies reported that from a third to more than 90% of participating woman rated CAM effective in treating many symptoms, with few reporting adverse effects from CAM use. Self-prescription of CAM and conventional medicine for CPPD appears widespread, probably reflecting not only symptom prevalence throughout women's reproductive lives, but also lack of effective treatment. Additionally there are reports of a relatively high placebo effect, from 10-50%, across both conventional and CAM treatments for CPPD [1,3,9,19], leading to uncertainty regarding general efficacy. This situation should raise concerns for healthcare providers across the board regarding both efficacy and safety and because concomitant use of conventional medicine and CAM has potential for adverse interactions but is often undisclosed to health professionals [35,52,56].

The reviewed papers clearly show that women use CAM to treat a wide range of CPPD symptoms from the most common dysmenorrhea and PMS to PMDD, fibroids, mastalgia, pelvic discomfort and endometriosis, with lower prevalence. However the level of CPPD symptoms and adopted treatments, other than PMS, has not been well explored in large samples of women below the age of 28 years. Our data whilst suggesting that CAM modalities are differentially preferred for particular aspects of CPPD is less clear if this is related to efficacy or simply reflects their official endorsement by medical practitioners amongst others.

Difficulties arise when comparing findings from the reviewed papers with reported studies varying greatly in sampling methodology (convenience, self-selection, random), sources (half arose from tertiary and conventional medical settings) and quality of survey instruments, only some of which were pre-tested and/or validated. Prevalence calculations of CAM use were made from varying baselines - whole mixed gender populations/women in selected age range/only women with CPPD of survey's interest. Levels of recall bias are likely to vary – five reviewed studies were prospective [7,16,39,42,51] compared to 39 which were retrospective questionnaires. In addition where supplied there was considerable variation in response rates (11%-100%), time frames for measuring CAM usage (last monthly cycle – ever) and detail of CAM lists, if supplied, which would alter levels of data capture. Indeed CAM was unspecified in 28 out of 45 of these studies. Finally as most reviewed papers did not include geographical location data the extent to which differential access to CAM therapies, particularly in rural communities, may have altered measured prevalence of CAM use is unknown. Importantly prevalence of total CAM use for CPPD is likely understated by our data as this was reported on individual modalities/treatments and many surveys reported women using more than one CAM entity. On the other hand the broad interpretation of CAM to include home remedies may have led to some overstatement of user prevalence.

An important limitation of this review is that only English language papers were included. In addition, the inclusion of papers over this long time frame, whilst highlighting changing trends in CAM use for women with CPPD, makes comparisons difficult as attitudes, acceptance and scope of CAM has changed markedly over the last three decades. Nevertheless, the papers reviewed do provide important confirmation of the substantial use of different CAM for a variety of CPPD and that CAM attracts high levels of perceived efficacy amongst users with CPPD. Review of the contemporary empirical literature also highlights the dearth of knowledge around a number of issues relating to CPPD and CAM use. Indeed, future empirical study is

needed to help investigate the CPPD issues for which women are using particular CAM, the profile of these women, reasons for their CAM choice and whether indeed the CAM has been a beneficial treatment. The simultaneous use of conventional medicine and CAM raises unknown safety concerns regarding interactions and adverse reactions [62] generally and is unexplored for this group of women. Arising from the practice of self-prescribing CAM are issues of suitability, levels for safe and/or effective dosage and treatment duration. Past concern over potential neurotoxicity with high-dose vitamin B_6 [19] should serve as a reminder that although CAM is natural with misuse it has the potential to cause harm. Finally, although cross-sectional studies may indicate prevalence of CPPD and CAM use they do not unequivocally establish causality. Clear, safe, reliable information on effective treatments, and most importantly the profile of users, would help inform both providers and women with CPPD towards evidence-based, coordinated care and treatment choices.

Conclusion

CPPD problems are widespread and treatment is likely to be either poor and/or professionally unsupervised.To contribute to more effective strategies to remedy this situation large-scale, national studies, including prospective, placebo-controlled studies on women with similar CPPD symptoms are much needed to determine CAM efficacy and safety. Further, future studies are also required, which addresses the characteristics of women who choose to use CAM, their motivation for doing so and their reasons for preferring self-treatment It is important for health providers at all levels to have a solid evidence base for prescribing treatments for CPPD and this requires the provision of good quality, reliable data.

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TABLE 1

Description of quality scoring system for the Complementary and Alternative Medicine (CAM) surveys reviewed.

Dimensions of Quality Assessment	Points Awarded[a]
Methodolgy	
A. Representative sampling strategy	1
B. Sample size >500	1
C. Response rate > 75%	1
D. Low recall bias – prospective or retrospective data collection within the past 12months	1
Reporting of participants' characteristics	
E. Status of CPPD assessed	1
F. Age	1
G. Ethnicity	1
H. Indicator of socio-economic status (e.g. income, education)	1
Reporting of CAM use	
I. Definition of CAM or modalities provided to participants	1
J. Participants can name CAM therapies/modalities used (open question)	1
K. Use of CAM modalities assessed	1

Data adapted from Adams et al. [35].

[a] Maximum score is 11 points.

Quality of studies was assessed based on representativeness of women in the sample through methodology and participant characteristics (A,B,C,D,F,G,H) validity of diagnosis to assess CPPD (E) and CAM use (I,J,K

Table 2 - Quality Assessment of Reviewed Articles

First Author	Methodology				Participant characteristics				CAM reporting			Total
	Sampling A	Size >500 B	Response rate >75% C	Recall bias D	Status of CPPD E	Age F	Ethnicity G	SES H	Defined to participants I	Participant can name (open) J	Use assessed K	
1. Kupperman et al. 2007	1	1	1	1	1	1	1	1	0	0	1	9
2. Sternfeld et al. 2002	1	1	0	1	1	1	1	1	1	0	1	9
3.Pan et al. 2014	1	1	1	1	1	1	1	1	0	0	1	9
4. Hsieh et al. 2008	1	1	1	2	1	1	0	0	1	0	1	9
5. Kronenberg et al. 2006	1	1	1	1	0	1	1	1	1	0	1	9
6. Gold et al. 2007	1	1	1	1	0	1	1	1	1	0	0	8
7. Ohde et al. 2008	1	1	1	1	1	1	0	1	1	0	0	8
8. Chawla et al. 2002	1	1	1	1	1	1	1	1	0	0	0	8
9. Singh et al. 1998	1	1	0	0	0	1	1	0	1	1	1	7
10.Cheng 2011	0	1	1	1	1	1	0	0	1	0	1	7
11 Cheng & Lin 2011	0	1	1	1	1	1	0	0	1	0	1	7
12.Hylan et al. 1999	1	1	0	1	1	1	0	1	0	1	0	7
13.Kraemer & Kraemer 1998	0	0	0	1	1	1	1	1	0	1	1	7
14. Baines et al. 2007	1	1	1	1	0	1	0	1	1	0	0	7
15.Awad et al. 2006	1	1	1	0	0	1	0	1	0	1	1	7

Table 2 continued

First Author	Methodology				Participant characteristics				CAM reporting			Total
	Sampling A	Size >500 B	Response rate >75% C	Recall bias D	Status of CPPD E	Age F	Ethnicity G	SES H	Defined to participants I	Participant can name (open) J	Use assessed K	
16. Campbell & McGrath 1999	0	0	0	1	1	1	0	1	1	0	1	6
17. Pullon et al. 1989	0	1	1	1	0	0	0	1	1	0	1	6
18.Corney & Stanton 1991	0	1	0	1	1	1	0	1	0	0	1	6
19.Borah et al. 2013	1	1	0	0	1	1	1	1	0	0	0	6
20. Tariq 2009	0	1	0	0	1	1	0	1	0	1	1	6
21.Tanaka et al. 2014	0	0	0	1	1	1	0	1	1	0	1	6
22. Hamaideh et al. 2014	0	0	0	0	1	1	0	1	1	1	1	6
23.Critchley et al. 2005	0	0	0	1	0	1	1	1	1	1	0	6
24. Lee et al. 2010	1	1	0	0	0	1	0	0	0	1	1	5
25. Chia et al. 2013	0	0	1	1	0	1	0	0	1	0	1	5
26. Eladawi et al. 2014	0	1	1	1	1	1	0	0	0	0	0	5
27.Cronje & Kritzinger 1991	0	0	1	0	0	1	1	0	0	1	1	5
28. Adegbesan-Omilabu et al 2014	0	0	0	0	1	1	0	1	0	1	1	5
30.Sharma et al, 2008	0	0	1	1	1	1	0	0	0	1	0	5
31.Cox et al. 2003	1	0	1	0	1	1	0	0	0	1	0	5
32.Nicholson 2006	0	1	1	0	0	1	1	0	0	1	0	5

Table 2 continued

First Author	Methodology				Participant characteristics				CAM reporting			Total
	Sampling A	Size >500 B	Response rate >75% C	Recall bias D	Status of CPPD E	Age F	Ethnicity G	SES H	Defined to participants I	Participant can name (open) J	Use assessed K	
33.Tolossa & Bekele 2014	0	0	1	0	1	1	0	0	0	0	1	4
34. Missimer & Bove 2011	0	0	0	0	1	1	1	0	0	0	1	4
35. Leather et al. 1993	0	0	0	0	1	1	0	0	0	1	1	4
36.Brito et al. 2012	0	1	0	0	0	1	0	0	0	1	1	4
37. Sawalha et al 2008	0	1	1	0	0	1	0	0	0	1	0	4
38. Byles et al. 1997	1	0	1	0	0	1	0	0	0	1	0	4
39.AlBraik et al. 2008	0	0	0	1	0	1	0	1	0	0	1	4
40. Chapple 1999	0	0	0	0	0	1	1	1	0	1	0	4
41.Domoney et al 2003	0	0	0	0	1	1	0	0	0	1	1	3
42.Abdul-Razzak et al. 2010	0	0	0	0	0	1	0	0	1	0	1	3
43.Brown & Zimmer 1986	0	0	0	0	0	1	0	0	0	1	1	3
44. Chen et al. 2006	0	0	0	0	0	1	1	0	0	1	0	3

Table 3 General Information on Research Articles into CAM and CPPD

First Author Country	Year / Resp. rate	Design/ Sample	Max. CAM Prevalence/ Baseline	CAM Therapies used/ List supplied?	Sample size/ Age range	Time frame reported / CAM self-prescribed	Symptoms treated/ Validated diagnostic assessment
1. Campbell et al. Australia	1997 69%	SCQ Multiple GP clinics	Ever - 34% 3 mo -21% Whole sample	Vitamins, massage, EPO Yes	310 18-45y	Ever and last 3 months Unspecified	Premenstrual Syndrome – physical and affective Yes
2. Domoney et al. United Kingdom	2003 N/A	SCQ 1 site- PMS clinic	Ever – 91% Current–35% Sufferers	Supplements, herbs, EPO acupuncture, homeopathy Unspecified	100 25 –54y	Ever and current Unspecified	Premenstrual Syndrome – unspecified GP referred
3. Singh et al. United States	1998 11%	Interviewer Commercial database (telephone)	1.5% Whole sample	Mind/body, massage, homeopathy, herbs, chiropractic, acupuncture Yes	1052 21 – 64y	Unspecified Unspecified	Premenstrual Syndrome – physical and affective Unspecified
4. Tolossa & Bekele Ethiopia	2014 86.4%	SCQ Tertiary students, 1 site	7.5% Whole sample	Hot drinks, massage Unspecified	173 18 – 25y	Unspecified Unspecified	Premenstrual Syndrome – physical and affective Yes
5. Pullon et al. New Zealand	1989 96%	Interviewer Multiple GP clinics	33% Sufferers	Massage, yoga, vitamin B_6 Yes	1456 15 – 54y	Last cycle Yes	Premenstrual Syndrome – physical and affective Unspecified
6. Lee et al. South Korea	2010 11.6%	SCQ Commercial database (on-line)	22.4% Sufferers	Chinese herbal medicine Yes- limited	500 15- 39y	Used at least once (Ever use) Unspecified	Dysmenorrhoea Unspecified
7. Corney & Stanton United Kingdom	1991 68 - 77%	SCQ Response to advert in two written media	Ever – 74% Last month -9% Sufferers	Vitamins, homeopathic, EPO Unspecified	658 16 – 45y	Ever and last month Unspecified	Premenstrual Syndrome – physical and affective Yes
8. Missmer & Bove United States	2011 33%	SCQ Support group	61% Sufferers	Massage, herbs, acupuncture, chiropractic Unspecified	94 16 – 58y	Unspecified Unspecified	Endometriosis leg pain Yes

N/A – Not Available SCQ – self-completed questionnaire EPO- Evening Primrose Oil *Calculated [I]Strong cultural/reliance on traditional medicine

Table 3 continued

First Author Country	Year / Resp. rate	Design/ Sample	Max. CAM Prevalence/ Baseline	CAM Therapies used/ List supplied?	Sample size/ Age range	Time frame reported / CAM self-prescribed	Symptoms treated/ Validated diagnostic assessment
9. Kupperman et al. United States	2007 75%*	Interviewer Multiple clinics	36.4% Sufferers	Acupuncture, herbs, dietary supplements Yes - limited	1493 31 – 54y	Current or prior (Ever use) Unspecified	Pelvic problems – physical and affective Yes
10. Chia et al. Hong Kong	2013 94%*	SCQ 1 site- tertiary students	62% 7% Sufferers	Warm beverage Dietary supplements, TCM Yes	240 18 -22y	Last 6 months Yes	Dysmenorrhoea Unspecified
11.Sternfeld et al. United States	2002 26%	SCQ HMO (telephone)	20.1% Sufferers	Dietary supplements, massage, mind-body, herbs Yes – limited?	1194 21 – 45y	Last 12 months Unspecified	Premenstrual Syndrome – physical and affective Yes
12. Borah et al. United States	2013 23%*	SCQ Commercial database (on-line)	26% Self-carers	"Herbs, supplements or other CAM" Unspecified	968 29 -59y	Unspecified Yes	Fibroids Yes
13.Gold et al. United States	2007 100%	SCQ & interviewer SWAN cohort	48.7% Whole sample	General CAM Yes- limited	3013 42 – 52y	Last 12 months Unspecified	Premenstrual Syndrome – physical and affective Unspecified
14. Ohde et al. Japan	2008 97.4%	Prospective diary National database	7.7% Sufferers	Dietary CAM Yes - limited	823 18 – 51y	Last month Unspecified	Dysmenorrhoea Yes
15. Tariq et al. Pakistan	2009 N/A	SCQ & Interviewer Multiple sites – hospital students, staff/patients	32% Sufferers	Household remedies, herbs, homeopathic Unspecified	1236 16 – 50y	Unspecified Unspecified	Dysmenorrhoea Unspecified
16. Abdul-Razzak et al. Jordan	2010 N/A	SCQ 1 site- tertiary students	21.3% Sufferers?	Herbs (supplement-users excluded) ? limited if yes	127 19 – 24y	Unspecified Yes	Dysmenorrhoea Unspecified
17. Cheng Taiwan	2011 95.4%	SCQ 1 site- nursing students	69.7% Treatment users	TCM, herb tea Yes	2758 18 – 55y	Last cycle Unspecified	Dysmenorrhoea Yes (by author)

N/A – Not Available SCQ – self-completed questionnaire EPO- Evening Primrose Oil *Calculated [I]Strong cultural/reliance on traditional medicine

Table 3 continued

First Author Country	Year / Resp. rate	Design/ Sample	Max. CAM Prevalence/ Baseline	CAM Therapies used/ List supplied?	Sample size/ Age range	Time frame reported / CAM self-prescribed	Symptoms treated/ Validated diagnostic assessment
18. Cheng & Lin Taiwan	2011 98%	SCQ 2 sites - tertiary students	35% freq Sx 23.9%* all Sx Sufferers	TCM, herb tea Yes	616 18 – 28y	Last 12 months Yes	Dysmenorrhoea Yes
19. Pan et al. Taiwan	2014 N/A	Data from national health database	53.4% Sufferers	TCM, herbs, acupuncture N/A	23118 menarche-50y	5-year use No	Dysmenorrhoea Yes
20. Eladawi et al. Egypt	2014 93.7%	SCQ 1 site - tertiary students	43.7% Sufferers	Hot drinks, herbs, massage Unspecified	797 17 – 31y	Last year Unspecified	Mastalgia Yes
21. Tanaka et al. Japan	2014 75%*	SCQ Commercial DB (on-line)	13.9% Outpatients	TCM Unspecified	274 15 – 49y	Last 3 months No	Dysmenorrhoea, fibroids, PMS -physical & affective, endometriosis Yes
22. Cronje & Kritzinger South Africa	1991 78.5%	SCQ 1 site -tertiary students	1.0%* Whole sample	Homeopathy Unspecified	102 19 – 21y	Unspecified Unspecified	Dysmenorrhoea No
23. Leather et al. United Kingdom	1993 N/A	SCQ 1 site - PMS clinic	92% Sufferers	Vit. B6, EPO, zinc, magnesium Unspecified	100 18 – 45y	Ever used Yes	Premenstrual syndrome Yes -GP referred
24. Adegbesan et al. Nigeria	2014 N/A	Interviewer 2 sites - hospital clinics	37.3% Sufferers	Herbs, cod liver oil Unspecified	300 20 – 49y	Unspecified Unspecified	Fibroids Yes
25. Brito et al. Brazil	2012 N/A	? Prospective study 1 site -tertiary students	16% Sufferers	Teas, massage Unspecified	634 18 – 53y	Unspecified Unspecified	Dysmenorrhoea No

N/A – Not Available SCQ – self-completed questionnaire EPO- Evening Primrose Oil *Calculated [ł]Strong cultural/reliance on traditional medicine

Table 3 continued

First Author Country	Year / Resp. rate	Design/ Sample	Max. CAM Prevalence/ Baseline	CAM Therapies used/ List supplied?	Sample size/ Age range	Time frame reported / CAM self-prescribed	Symptoms treated/ Validated diagnostic assessment
26. Hylan et al. United Kingdom, United States, France	1999 N/A	Interviewer by telephone Commercial database	23% Sufferers	Non-prescription medicines included EPO & OTC drugs Unspecified	1045 18 – 49y	Current Unspecified	Premenstrual Syndrome - physical and affective Yes
27. Kraemer & Kraemer United States	1998 70**%?**	SCQ Recipients of pharmacy newsletter	Ever -91.4 Last yr -62.5% Sufferers	Vitamin/mineral Vitamins, minerals, EPO Unspecified	220 26 – 56y	Ever and Last 12 months Unspecified	Premenstrual Syndrome Yes
28. Brown & Zimmer United States	1986 N/A	SCQ Attendees at talk on PMS	12% Sufferers	Chiropractor, nutritionist, osteopath, clergy Unspecified	83 18 – 43y	Unspecified No	Premenstrual Syndrome No
29. Hamaideh et al. Jordan	2014 73%	SCQ 1 site - tertiary students and employees	24.4% 53.5% Whole sample	Cinnamon tea/supplements hot fluids? Yes	254 18 – 45y	Unspecified - "usually used" Yes	Premenstrual Syndrome PMDD-physical and affective Yes
30.Seven et al. Turkey	2014 94%*	SCQ 1 site - Volunteer tertiary students	34.3% Sufferers	Massage, herb tea Unspecified	371 18 – 23y	Unspecified Unspecified	Dysmenorrhoea Yes
31. Sharma et al. India	2008 89.3%	Interviewer 1 site- tertiary students	40%/?	Home remedies, Ayurvedic or homeopathic medicine Unspecified	100 17 – 23y	Last 3 months Unspecified	Cyclic Perimenstrual Pain and Discomfort No
32. Chawla et al. United States	2002 51.6%	SCQ – prospective study HMO- Randomly selected	?Likelihood Sufferers	General alternative medicine provider Unspecified	1194 21 - 45y	Last 12 months Practitioner	Premenstrual Syndrome and PMDD (affective) Yes

N/A – Not Available SCQ – self-completed questionnaire EPO- Evening Primrose Oil *Calculated [I]Strong cultural/reliance on traditional medicine

Table 3 continued

First Author Country	Year / Resp. rate	Design/ Sample	Max. CAM Prevalence/ Baseline	CAM Therapies used/ List supplied?	Sample size/ Age range	Time frame reported / CAM self-prescribed	Symptoms treated/ Validated diagnostic assessment
33. Cox et al. Australia	2003 65%	Focus group National sufferers	98.4%* Sufferers	Various Unspecified	61 20 - 64 y	Unspecified Unspecified	Endometriosis Yes
34. Sawalha et al. Palestine	2008 98.6%	SCQ 1 site- tertiary students	33.9% Mixed gender	Herbal medicine Unspecified	1581 17 – 24 y	Unspecified Yes	General health issues included dysmenorrhoea No
35. Nicholson New Zealand	2006 97.2%	SCQ 1 hospital site	38.1% E.D. patients	General excl. Vitamin/mineral supplements Unspecified	1043 14 – 97 y	Unspecified Mixed	General health issues included dysmenorrhoea No
36. Critchley et al. Hong Kong	2005 N/A	Interviewer 1 hospital site Preoperative patients	90% 44% Mixed gender	Chinese herbs in soup/tea Practitioner prescribed Yes	259 14 – 96 y	Last 12 months Mixed	General and gynaecology Included fibroids No
37. Byles et al. Australia	1997 60%	Focus group Survey sample of sufferers from 1 state	N/A Sufferers	General alternative medicine Unspecified	31 33 – 50 y	Unspecified Unspecified	Cyclic Perimenstrual Pain and Discomfort Unspecified
38. Baines et al. Australia	2007 68%	SCQ Longitudinal study on dietary habits	26.2% Whole sample	Alternative health practitioner Unspecified	9113 22 - 27 y	Last 12 months No	Various menstrual symptoms No
39. Chen et al. Taiwan	2006 N/A	Focus group 1 site –Medical school	N/A Sufferers	Various CAM therapies Unspecified	23 16 – 19 y	Unspecified Yes	Dysmenorrhoea Unspecified

N/A – Not Available SCQ – self-completed questionnaire EPO- Evening Primrose Oil *Calculated [ł]Strong cultural/reliance on traditional medicine

Table 3 continued

First Author Country	Year / Resp. rate	Design/ Sample	Max. CAM Prevalence/ Baseline	CAM Therapies used/ List supplied?	Sample size/ Age range	Time frame reported / CAM self-prescribed	Symptoms treated/ Validated diagnostic assessment
40. AlBraik et al United Arab Emirates	2008 N/A	Interviewer and SCQ 1 site health clinic	76% 38% 34% Mixed gender	Herbal medicine ever Herbal medicine current Herbal practitioner ever Unspecified	330 15 – 55+ y	Last 6 months and current Mixed	General health issues included dysmenorrhoea No
41. Awad & Eltayeb Sudan	2006 83.3%	SCQ 3 cities random stratified	53.5% Mixed gender	Herbal medicine Unspecified	1000 20 – 60+ y	Last 2 months Yes	General health issues including dysmenorrhoea No
42. Hsieh et al. Taiwan	2008 N/A	2004 records National Health database	28.1% Mixed gender	Chinese Medicine Yes	166929 0 – 76+ y	Last 12 months No	All health issues including menstrual disorders Yes
43. Chapple United Kingdom	1999 N/A	Focus group Local interest groups with snowball sampling	10%? Sufferers	EPO and homeopathy Unspecified	30 15 – 53 y	Unspecified Unspecified	Menorrhagia No
44. Kronenberg et al. United States	2006 69 – 79%	Interviewer by telephone Commercial database	64.4% All women	Variety of CAMs and CAM practitioner used Yes	3068 18 – 50+ y	Last 12 months Unspecified level incl. practitioner use	General health issues including fibroids No

N/A – Not Available SCQ – self-completed questionnaire EPO- Evening Primrose Oil *Calculated [ł]Strong cultural/reliance on traditional medicine

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Appendix 2

Questionnaire for Western Herbalists and Naturopaths

Women commonly experience menstrual problems at some time during their reproductive years. These include symptoms around menstruation and with menstrual cycles. Although over 200 menstrual symptoms have been noted, the main ones can be categorised as: 1) physical, most frequently dysmenorrhoea, headache, bloating, breast tenderness, nausea; and 2) mental/emotional, the best known being premenstrual syndrome (PMS) but including depression, anxiety, irritability and tearfulness. Often women experience a combination of these, although not necessarily with every cycle or with the same intensity. Menstrual cycle problems relate also to heavy periods and cycle irregularity.

The aim of this questionnaire is to investigate to what extent and how western herbalists currently treat clients presenting with dysmenorrhoea, PMS, irregular and/or heavy periods either as a primary or secondary health issue. Also of interest are the costs for clients associated with herbal treatment, its efficacy, the level of inter-referral between health practitioners and the extent to which clients are known to be combining their herbal medicine use with conventional treatments. It is also intended to try and gain insight into women's motivation for using herbal medicine.

Section 1 - Professional demographics

1. Age (years)
2. Gender
3. Do you practice in more than one location?
    a. No
    b. Yes

4. Which of the following best describes you practice location(s)

    Urban rural remote

5. What is you highest qualification in herbal medicine
    a) Diploma
    b) Advanced diploma
    c) Bachelor Degree
    d) Post-graduate degree
    e) Other: _____

6. In what year did you receive this qualification? _____
7. .....

Section 2 - Details of your Practice

8. Which of the following best describes your clinic:-
    a. I am a sole practitioner in my clinic.

b. There are other herbalists/naturopaths/CAM practitioners in my clinic.
c. I work in an integrated clinic with other CAM and allied health/medical practitioners.
d. I am the only CAM practitioner working in an allied health/medical practitioner practice

9. If you are not a sole practitioner, how many other practitioners work in your clinic setting?

10. Do you conduct any telephone or Skype consultations?

11. How many clients do you see on average in a week at your clinic(s)?

0-5 6-10 11-20 21-40 41 or more

12. What percentage of your clients are:-

a) female?.....%
b) post-menarche and pre-menopausal i.e. of reproductive age?.....%

13. What is the average duration of an initial consultation with a new client? ___ minutes

14. What is the average duration of subsequent or follow-up consultations? ___ minutes

.....

Section 3 - Practice regarding treatment of clients with PMS, dysmenorrhoea, heavy and/or irregular periods

15. How comprehensive do you feel your professional training was in teaching you to recognise and treat these specific menstrual problems?

Very Somewhat Neutral Not very Not at all

16. How confident are you in diagnosing the range of symptoms associated with these types of menstrual dysfunction?

Very confident Somewhat confident Neutral Not very confident Not at all confident

17. What methods do you use to diagnose these specific menstrual problems?

a) Standard diagnostic laboratory tests
b) DSM or other validated questionnaires
c) Charts

d) Client history, taken during consultation
e) Other (please specify) _____

18. Do you specifically ask all female clients of reproductive age for details about their menstrual cycles?

Always Often Sometimes Never

19. If your answer to question 16 above was other than always, what is/are the reason(s) for not asking?

a) Not always enough time
b) Client seems embarrassed/reluctant to discuss menstruation
c) Client did not mention any menstrual problems so assumed there were no problems
d) Client on reproductive hormone medication so seems irrelevant
e) This information did not seem relevant to client's presenting complaint
f) Other (please specify)

20. How many clients do you see per week who you believe have these specific menstrual problems?

Number _____

21. On average how many women in a month would seek your services because these types of menstrual symptom(s) are their main health issue(s)?

Number _____

22. What percentage of your treatment for these menstrual health problems is represented by:-

a) Simples (single herbs) __%
b) Pre-formulated products __%
c) Individualised formulas __%

23. What is the average weekly cost to your client for the herbal medicine component with particular regard to treating these particular menstrual problems? $___

24. What is the **average** duration of your treatment for these specific menstrual problems?

a) 3 months or less
b) 4-6 months
c) 7-12 months
d) More than 12 months

e) Other – please specify

25. How frequently, **on average**, would you see a client you are treating for these specific menstrual problems?

    a) After each cycle
    b) After 2 cycles
    c) After 3 cycles
    d) Leave it to the client to decide
    e) Other – please specify

26. Do you use any of the following methods to evaluate the effectiveness of your treatment for these menstrual problems?

    a) Questionnaire Y/N
    If yes please specify type

    b) Laboratory tests Y/N
    If yes please specify which

    c) Client's self-reporting Y/N

    d) Other – please specify

27. Please indicate by ticking the appropriate box how effective you think herbal medicine is for treating the following:-

	Almost always	**Sometimes**	**Rarely**	**Never**
PMS				
Irregular periods				
Heavy periods				
Dysmenorrhoea				

28. Please indicate below which herbs you would most often prescribe for each menstrual condition listed.

	Herbs
PMS	
Irregular Periods	

Heavy Periods	
Dysmenorrhoea	

29. What do you believe are the most important benefits to clients with these menstrual problems who are treated with herbal medicine? (You may choose more than one option.)

    a) Very effective
    b) Lower risk/incidence of side-effects
    c) Holistic approach to better health
    d) Better for long term well being
    e) Other (please specify)

30. What do you believe is/are the downside(s) to your clients who are using your services as a medical herbalist to treat these menstrual problems? (You may choose more than one option.)

    a) Poor compliance in taking your herbal medicine
    b) Too expensive
    c) Lack of collaborative support from medical practitioner(s)
    d) Missed diagnosis of serious underlying problem
    e) Lack of knowledge by client's medical practitioner(s) of their herbal medicine use
    f) Side-effects
    g) Other (please specify)

31. Please indicate by ticking the appropriate box how frequently side effects reported by your clients with these menstrual problems from your treatment using herbal medicine?

	Never	**Rarely**	**Sometimes**	**Often**
Headache				
Insomnia				
Bloating				
Nausea				
Diarrhoea				
Other (please specify)				

32. Do you follow the latest research into CAM use for these specific menstrual problems?

    Yes No

33. If you answered "Yes" to question 31 above, which sources do you use to achieve this? (You may choose more than one option.)

    a) CAM manufacturers/suppliers information/seminars
    b) Professional body's information/seminars
    c) Independently presented workshops/seminars
    d) Scientific journals
    e) Internet
    f) Evidence-based textbooks
    g) Other (please specify)
    .....

Section 4 - Interaction with other health practitioners

34. In general how often do you formally contact other CAM health practitioners regarding care of clients with these menstrual problem(s)?

    Often Sometimes Rarely Never

35. In general how often do you formally contact allied or medical health practitioners regarding care of clients with these menstrual problem(s)?

    Often Sometimes Rarely Never

36. In general how often are you formally contacted by other CAM health practitioners regarding care of clients with these menstrual problem(s)?

    Often Sometimes Rarely Never

37. In general how often are you formally contacted by allied or medical health practitioners regarding care of clients with these menstrual problem(s)?

    Often Sometimes Rarely Never

38. Which types of health practitioners, to your knowledge, have recommended you/herbal medicine to clients to treat these menstrual problems? (You may choose more than one option.)

    a) Medical specialist
    b) General practitioner

c) Counsellor
d) Psychologist/psychiatrist
e) Other health carer (please specify)
f) Other CAM practitioner (please specify)
g) None of these

39. Which health practitioners do **you refer** your clients to with regard to treating these menstrual problems? (You may choose more than one option.)

a) General practitioner
b) Counsellor
c) Women's clinic
d) Other CAM practitioner (please specify)
e) None
f) Other (please specify)

40. How comfortable are you in communicating with your clients' conventional health practitioner(s) about these menstrual problems?

Very Somewhat Neutral Not very Not at all

41. How do you communicate with your clients' conventional health practitioners about these menstrual problem(s). (You may choose more than one option.)

a) Phone
b) Letter
c) Email
d) Indirectly through client
e) Other (please specify)

42. How desirable do **you** think it is to collaborate with conventional medical practitioners with respect to your treatment of clients with these menstrual problems?

Very Somewhat Neutral Not very Not at all

43. How important do you think it is that there is scientific research conducted into the treatment of these menstrual problems using herbal medicine?

Very Somewhat Neutral Not very Not at all

44. How significant is the strength of scientific research into a particular herb in altering your decision to prescribe it?

Very Somewhat Neutral Not very Not at all

45. Do you encourage your clients to disclose their use of herbal medicine to their conventional medical practitioner?

    Always Sometimes Rarely Never

    .....

Section 5 - Information about your clients regarding treatment

46. When treating these menstrual problems do you enquire if the client has already consulted their medical practitioner for this particular problem?

    Always Sometimes Rarely Never

47. What percentage of your clients with these menstrual problems has received 'conventional' medical treatment for the problem(s) prior to consulting with you?
    ___%

48. Do you know if clients consulting you with these menstrual problems are using, or have used, 'conventional' and herbal medicine concurrently?

    Always Sometimes Rarely Never

49. Do you know why your client has chosen to use herbal medicine to treat their menstrual problem?

    Always Sometimes Rarely Never

50. If the answer to question 48 above is "Always", "Sometimes" or "Rarely" can you please indicate, the main reasons given.

    a) Prefer a natural solution
    b) Wish to conceive in the future
    c) Conventional medicine has been unhelpful
    d) Dissatisfaction with previous experience(s) of conventional medicine/practitioners
    e) Wishes to have more control over own health
    f) A family member or friend with similar problems had success using herbal medicine
    g) Other (please specify)

51. Do you know if clients with these menstrual problems have chosen to consult with you/a western herbalist because of advice/information from any of the following (you may choose more than one option):-

    a) Family member or friend?

b) Media coverage such as newspaper, magazine or radio?
c) Book
d) Internet?
e) Medical practitioner?
f) CAM practitioner?
g) Allied health provider (e.g. nurse, physiotherapist)?
h) Public presentation by you or other western herbalist?
i) Other?

Appendix 3

The use of complementary and alternative medicine by 7,427 Australian women with cyclic perimenstrual pain and discomfort.

Fisher C, Adams J, Hickman L, Sibbritt D.

Abstract

Objective

To assess the prevalence of cyclic perimenstrual pain and discomfort and to detail the pattern of complementary and alternative (CAM) use adopted by women for the treatment of these symptoms.

Method

Data from the 2012 national Australian Longitudinal Study of Women's Health (ALSWH) cross-sectional survey of 7427 women aged 34-39 years were analysed to estimate the prevalence of endometriosis, premenstrual syndrome (PMS), irregular or heavy periods and severe dysmenorrhoea and to examine the association between their symptoms and their visits to CAM practitioners as well as their use of CAM therapies and products in the previous 12 months.

Results

The prevalence of endometriosis was 3.7% and of the perimenstrual symptoms assessed, PMS was most prevalent at 41.2% whilst irregular bleeding (22.2%), heavy periods (29.8%) and severe period pain (24.1%) were reported at lower levels. Women with endometriosis were more likely than non-sufferers to have consulted with a massage therapist or acupuncturist and to have used vitamins/minerals, yoga/meditation or Chinese medicines ($p<0.05$). PMS sufferers were more likely to consult with an osteopath, massage therapist, naturopath/herbalist or alternative health practitioner and to have used all forms of CAM therapies except Chinese medicines than women who had infrequent PMS (all $p<0.05$). Women with irregular periods did not have different patterns of CAM use from non-sufferers and those with heavy periods did not favour any form of CAM but were less likely to visit a massage therapist or use yoga/meditation than non-sufferers ($p<0.05$). For women with severe dysmenorrhoea there was no difference in their visits to CAM practitioners compared to non-sufferers but they were more likely to use aromatherapy oils ($p<0.05$) and for more frequent dysmenorrhoea also herbal medicines, Chinese medicines and other alternative therapies compared to non-sufferers (all $p<0.05$).

Conclusion

There is a high prevalence of cyclic perimenstrual pain and discomfort amongst women in this age group. Women were using CAM differentially when they had specific symptoms of cyclic perimenstrual pain and discomfort. The use of CAM needs to be properly assessed to ensure their safe, effective use and to ascertain their significance as a treatment option enabling women with menstrual problems and their care providers to improve their quality of life.

Keywords: endometriosis, premenstrual syndrome, irregular periods, heavy periods, severe dysmenorrhoea, complementary and alternative medicine.

Introduction

Menstruation is a normal, cyclic event spanning a women's life from the onset of puberty (usually around 12-13 years of age) through to menopause (which most women experience around 50 years of age). Although the phenomenon of cyclic problems experienced by women during their reproductive years had been recognised by Hippocrates (Richardson, 1995) modern science has not yet fully explained the causes of the variety of symptoms that can accompany the menstrual cycle (Bancroft, 1995; Nevatte, T. et al., 2013; Richardson, 1995; Yonkers et al., 2008). Moreover symptoms have been treated as separate entities, most commonly identified as either premenstrual syndrome (PMS) or dysmenorrhoea, although their co-existence was highlighted by Bancroft in 1995 (Bancroft, 1995). Affective symptoms like irritability and depression and physical symptoms such as bloating, dysmenorrhoea, nausea and breast tenderness often occur in the luteal phase of the cycle and/or into menstruation. Symptoms may vary in severity and scope from one cycle to the next and are likely due to a number of different factors (Bancroft, 1995; Collins Sharp, Taylor, Thomas, Killeen, & Dawood, 2002; Halbreich, U., 2003; Milewicz & Jedrzejuk, 2006). Such changes were labelled 'cyclic perimenstrual pain and discomfort' (CPPD) by the Association of Women's Health, Obstetric and Neonatal Nurses (Collins Sharp et al., 2002) to better reflect the protean nature of symptoms. It is estimated that between 80%-97% of women worldwide and across age groups experience at least one symptom during their reproductive life (Halbreich, U., 2003; Ju, Hong et al., 2014; Milewicz & Jedrzejuk, 2006; Wittchen et al., 2002). For up to 40% of women (Milewicz & Jedrzejuk, 2006) symptoms are moderate and for a further 2%-10% of women symptoms are severe enough to interfere with normal daily life (Halbreich, U., 2003; Nevatte, T. et al., 2013; Sundell et al., 1990; Wittchen et al., 2002). It is possible that the prevalence of CPPD has increased as modern women are exposed to sex-hormone cycles for a greater proportion of their lives due to earlier onset of menarche, reduced number of births and the delayed resumption of menstrual cycles consequent on breastfeeding. Though cultural differences may change women's perception of, and treatment-seeking behaviour for, CPPD, its prevalence does not appear to be a cultural factor (Cheng, 2011a; Halbreich, U., 2003; Ju, H. et al., 2014; Lee, A. M. et al., 2009; Nevatte, T. et al., 2013; Pan et al., 2014; Sundell et al., 1990; Wittchen et al., 2002).

Complementary and alternative medicine (CAM) includes a range of diverse health-related strategies that can be described as predominantly operating outside the conventional medical curriculum and medical profession (WHO, 2000). The prevalence of CAM use worldwide is substantial (Harris, P. E. et al., 2012b; Thomson et al., 2014a; WHO, 2000), especially amongst women (Barnes, P. M. et al., 2009; Kristoffersen et al., 2014; Sibbritt, D. W. et al., 2004; Steinsbekk et al., 2009; Xue et al., 2007). There is an acceptance of a multi-factorial aetiology for CPPD (Bancroft, 1995; Kaunitz et al., 2008; Nevatte, T. et al., 2013) and to-date conventional treatment protocols, which focus on symptom-relief, ranging from counselling to pharmaceutical to surgical, have been employed. Neither single nor combinations of conventional therapies have produced consistent positive outcomes for CPPD (Collins Sharp et al., 2002) and a large variety of both conventional and CAM approaches have been promoted by medical practitioners (Collins Sharp et al., 2002; Weisz & Knaapen, 2009). Indeed there are clinical trials that support the use of CAM for aspects of CPPD such as *Vitex agnus-castus* (Schellenberg, 2001) or Chinese herbs (Jia et al., 2006) for PMS and Transcutaneous Electrical Nerve Stimulation (TENS)(Lauretti et al., 2015) or acupuncture(Witt et al., 2008) for dysmenorrhoea. Previous work exploring CAM use for CPPD symptoms has revealed prevalence rates between 3% -70% (Adegbesan-Omilabu et al., 2014b; Borah et al., 2013; Brito et al., 2012; Cheng, 2011a; Cheng & Lin, 2011; Chia, Lai, Cheung, Kwong, Lau, & Leung, 2013; Eladawi et al., 2014; Hamaideh et al., 2014; Lee, D. Y. et al., 2010; Missmer & Bove, 2011; Ohde et al., 2008; Pan et al., 2014; Seven et al., 2014; Sharma, A. et al., 2008; Tanaka et al., 2014;

Tariq et al., 2009; Tolossa & Bekele, 2014) although prevalence of women's CAM use at any point for CPPD is likely to be very much higher (Corney & Stanton, 1991; Domoney et al., 2003a; Leather et al., 1993). Unfortunately, the extent of this behaviour is unknown, particularly in Western countries as few recent studies have been undertaken. In addition there is a lack of good quality studies published in the peer-reviewed literature and surveys have varied widely in sample size and source, baseline and timeframe for measurement, questionnaire quality and method of data collection. All health practitioners need to be better-informed about this usage to enable more effective and safer symptom management.

Therefore, in an attempt to fill this gap in knowledge regarding CAM use for CPPD, this study presents a detailed analysis of the prevalence of CPPD symptoms in women from the large, nationally-representative Australian Longitudinal Study on Women's Health (ALSWH), examining the specific CAM adopted by women, over a twelve month timeframe, according to their symptoms.

Method

Sample

Data was obtained from the (born in) 1973-78 cohort of the Australian Longitudinal Study on Women's Health (ALSWH). In 1996, the ALSWH participants were randomly selected from the national Medicare database, which is the universal healthcare provision for all Australians. The recruited sample comprised over 58,000 women from 3 aged groups (ie. 'young': 18-23 years; 'mid age': 45-50 years; 'older': 70-75 years), to examine women in the key stages of the lifespan. The recruited women have been surveyed, via postal questionnaires, at regular 3-yearly intervals. The ALSWH was designed to follow the cohorts over 20 years to monitor changes in health and are intended to help guide national health policy and provision. The analyses presented in this study were restricted to Survey 6 (conducted in 2012) of the young cohort (when they were aged 34-39 years), which included 8,009 respondents, a retention rate of eligible participants for this survey of 61.6%. In the first survey 14,247 women in this age group participated, census data for this demographic at the time of recruitment was 759,680. Ethical approval for the ALSWH was gained from the Human Ethics Committees at the University of Queensland and University of Newcastle. The study participants provided written consent.

Cyclic perimenstrual pain and discomfort symptoms

Women were asked if they had been diagnosed with endometriosis in the last 3 years. In addition, they were also asked how frequently they experienced premenstrual tension, irregular periods, heavy periods and severe period pain in the previous 12 months, with the response option being 'never', 'rarely', 'sometimes' or 'often'.

Complementary and alternative medicine use

Women's consultations with CAM practitioners were ascertained by questionnaire items asking them is they had consulted any of a list of practitioners, for their own health, in the previous 12 months. The list of CAM practitioners included: chiropractor, osteopath, massage therapist, acupuncturist, naturopath/herbalist, and 'another alternative' health practitioner.

Women's use of CAM practices or products was ascertained by questionnaire items asking them how frequently they had used any of a list of therapies or products, for their own health, in the previous 12 months. The list of therapies or products included: vitamins/minerals, yoga/meditation, herbal medicines, aromatherapy oils, Chinese medicine and 'other

alternative practices or products'. Possible response options were 'never', 'rarely', 'sometimes' and 'often'. Those responding 'never' or 'rarely' were categorised as non-users and the 'sometimes' and 'often' responders were classified as users for analysis purposes.

Confounders

Potential confounders identified (that were available in the questionnaire) were the demographic factors area of residence, educational status, ability to manage on income and marital status and the co-morbidities of insulin-dependent (Type 1) diabetes, non-insulin dependent (Type 2) diabetes, low iron (iron deficiency or anaemia), depression, anxiety disorder, asthma, 'other cancer' and hypertension .

Area of residence was categorised as either urban or rural. Educational status was grouped as one of three categories: no formal qualifications, year 10 or equivalent (eg. school certificate), year 12 or equivalent (e.g. higher school certificate); trade /apprenticeship or certificate/diploma; and university degree. Ability to manage on available income was also grouped as one of three categories: it is impossible or it is difficult all of the time; it is difficult some of the time; and it is not too bad or it is easy. Marital status was grouped into three categories: never married; married/de facto; and separated or divorced or widowed.

Statistical Analysis

Bivariate analyses testing the association between CPPD symptom and CAM practitioner or CAM therapy use was conducted using chi-square tests. Logistic regression models were used to determine magnitude of association between CPPD symptom and CAM practitioner or therapy use, with adjustment for confounding variables. Statistical significance was set at the α=0.05 level for all analyses, using the statistical package STATA 14.0.

Results

There were 7,427 women who indicated they had not had a bilateral oophorectomy and were either not pregnant or unsure if they were pregnant. Amongst these women, the prevalence of CPPD-related problems was 3.7% for endometriosis, 41.2% had suffered from PMS sometimes or often, 22.2% had had irregular periods sometimes or often, 29.8% had experienced heavy periods sometimes or often and 24.1% had had severe period pain sometimes or often. Those women with endometriosis may account for around 4.9% of more frequent (ie. sometimes/often) PMS sufferers, 6.1% of more frequent cases of irregular periods, 6.1% of more frequent heavy periods and 8.3% of more frequent severe period pain sufferers.

The association between CAM practitioner consultations and CPPD symptoms are presented in Table 1. Women with endometriosis were significantly more likely to consult with a massage therapist, acupuncturist, and/or naturopath/herbalist compared to women who did not have endometriosis (all $p<0.05$). Consultations with a naturopath/herbalist were significantly higher for women suffering with irregular or heavy periods, compared to those without irregular and/or heavy periods (all $p<0.05$). Similarly, women with severe period pain were significantly more likely to consult with an acupuncturist and/or a naturopath/herbalist, compared to women without severe period pain (all $p<0.05$). Compared to women without PMS, women with PMS were significantly more likely to consult with a massage therapist, acupuncturist, naturopath/herbalist and 'other alternative health practitioner' (all $p<0.05$).

Table 2 shows associations between use of CAM practices/products and CPPD symptoms. Women with PMS and/or painful periods were significantly more likely to use all CAM

practices/products frequently, compared to women without PMS and/or painful periods (all $p<0.05$). With the exception of aromatherapy oils, endometriosis sufferers were significantly more likely to use all other CAM practices/products, compared to women without endometriosis (all $p<0.05$). Women who were suffering with irregular periods were more likely to use vitamins/minerals, herbal medicines, Chinese medicines, and/or 'other alternative practices and products', compared to women who did not suffer with irregular periods (all $p<0.05$). Women with menorrhagia were significantly more likely to use herbal medicines, aromatherapy oils and/or 'other alternative practices and products' compared to non-sufferers (all $p<0.05$).

Logistic regression modelling was used to determine the magnitude of associations between CPPD related problems and consultations with CAM practitioners, after adjusting for confounders (Table 3). Endometriosis sufferers were nearly 50% more likely to have consulted a massage therapist (OR= 1.48; 95% CI: 1.14, 1.92) and nearly twice as likely to have consulted with an acupuncturist (OR=1.79; 95% CI: 1.26, 2.56), compared to women without endometriosis. Women who 'sometimes' suffered PMS were more likely to have visited with a massage therapist (OR=1.29; 95% CI: 1.12, 1.48) but for 'often' sufferers this association was higher (OR=1.47, 95% CI: 1.23, 1.76), whilst 'sometimes' sufferers were also more likely to visit a naturopath/herbalists (OR=1.48, 95% CI: 1.19, 1.85) but were more than twice as likely to have done so when the PMS occurred 'often' (OR=2.12, 95% CI: 1.62, 2.76). Those women who indicated PMS occurred 'often' were over 60% more likely to have had osteopathic treatment (OR=1.64, 95% CI: 1.19, 2.20), and/or visited 'another alternative health practitioner' (OR=1.66, 95% CI: 1.20-2.29). Women who experienced heavy periods 'often' were 30% (OR=0.70, 95% CI: 0.56, 0.87) less likely to have used a massage therapist. No statistically significant associations were observed between any of the CAM practitioner groups and irregular periods or painful periods.

Table 4 shows the results of logistic regression modelling used to determine the magnitude of associations between CPPD related problems and use of CAM practices/products, after adjusting for confounders. Women with endometriosis were more likely to have used vitamins/minerals (OR=1.72; 95% CI: 1.24, 2.38), yoga/meditation (OR=1.80; 95% CI: 1.37, 2.38) and/or Chinese medicines (OR=1.86; 95% CI: 1.22, 2.83), compared to women without endometriosis. PMS sufferers showed around a 30% (OR=1.31; 95% CI: 1.09, 1.56) increased likelihood to have used herbal medicine if their symptoms were 'rare' but this likelihood increased for 'sometimes' sufferers (OR=1.49; 95% CI: 1.25, 1.77) and was greatest for 'often' sufferers (OR=1.72; 95% CI: 1.39, 2.14). Those who suffered PMS 'sometimes' or 'often' were also more likely to use vitamins/minerals (OR=1.31; 95% CI: 1.13, 1.52 and OR=1.47; 95% CI: 1.21, 1.80 respectively), yoga/meditation (OR=1.34; 95% CI: 1.14, 1.59 and OR=1.64; 95% CI: 1.33, 2.02 respectively), aromatherapy oils (OR=1.49; 95% CI: 1.23, 1.80 and OR=1.53; 95% CI: 1.21, 1.94 respectively) and/or 'other alternative therapies' (OR=1.46; 95% CI: 1.16, 1.84 and OR=1.69; 95% CI: 1.27, 2.23 respectively). Women who experienced heavy periods 'often' were less likely to use yoga/meditation (OR=0.68; 95% CI: 0.53, 0.88), compared to women who 'never' experienced heavy periods. Women who 'sometimes' had severe period pain were more likely to have used aromatherapy oils (OR=1.46; 95% CI: 1.17, 1.82) but if the dysmenorrhoea was 'often' this likely use increased to over 70% (OR=1.76; 95% CI: 1.30, 2.38). This group of 'often 'dysmenorrhoea sufferers were also more likely to have used herbal medicines (OR= 1.63; 95% CI: 1.24, 2.15) and/or 'other alternative therapies' (OR=1.73; 95% CI: 1.21, 2.47), compared to women who 'never' experienced dysmenorrhoea. There were no significant associations between the irregular period categories and use of any CAM therapies or products.

Discussion

The prevalence for endometriosis in this cohort was 3.7%, which is supported by the Global Burden of Disease Study 2013 which estimated the prevalence of CPPD at 4.8% for the years 2006-13 (Vos et al., 2015).

The prevalence for PMS of 43.3% in our study compares favourably with that from international data of 47.8% from a meta-analysis based on 17 international studies from 1996 – 2011 (Direkvand-Moghadam et al., 2014). Irregular periods were experienced by 22.3% of women in our cohort. A broad range of prevalence estimates of irregular periods 6.5%-83.3% was reported from a systematic review of data from developing countries (Harlow & Campbell, 2004) and 25.6% of 18-40 year-old nulliparous Danish women self-reported irregular periods (Hahn et al., 2013). Our cohort had a menorrhagia prevalence of 29.9% which tallies well with self-reported assessments elsewhere; a review of the literature up to 2005 found six reports of prevalence of heavy periods of between 10-30% with lower levels objectively determined while higher levels were based upon subjective assessments (Liu et al., 2007). The prevalence of severe period pain determined from our data, at 24.2%, falls within the range derived from a 2002-2011 review across 15 studies of 2-29% severe period pain (Ju, Hong et al., 2014). Comparative data for the same age group is limited, but includes Korean (Lee, D. Y. et al., 2010), Japanese (Ohde et al., 2008) and UK (Santer et al., 2005) surveys where the prevalence was 68%, 29.2% and 15% respectively however only the latter two were based on severe levels of dysmenorrhoea.

CAM use for CPPD

After adjusting for potential confounders, women with endometriosis in our sample were much more likely to visit with a massage therapist and/or acupuncturist and to use vitamins/minerals, yoga/meditation and/or Chinese medicines. Massage and acupuncture has previously been reported by endometriosis sufferers as satisfactory treatment for its associated leg pain (Missmer & Bove, 2011) and there is evidence that Chinese medicines and acupuncture can reduce both endometriosis signs and symptoms (Kong et al., 2014). Whilst no other direct research has been carried out into CAM for endometriosis there are studies indicating vitamins/minerals for reducing dysmenorrhoea which is a significant factor in symptomatic endometriosis (Fugh-Berman & Kronenberg, 2003).

Our analyses indicate that frequent PMS sufferers are more likely than those women who never or rarely experience this symptom to visit with a massage therapist or naturopath/herbalist, as well as increasing the likelihood of visiting an osteopath. All CAM practices and products included in this study were used with a significantly greater likelihood by women with PMS than those who either did not, or rarely experienced PMS, except for Chinese medicines and that there was an increasing trend to use herbal medicine with increasing frequency of PMS. PMS is the most common CPPD symptom in our cohort and lack of specific, effective medications may account for the higher observed likelihood of use of multiple CAM practitioners and therapies. As reported in previous studies, more than half of PMS sufferers who used vitamins/dietary supplements (Campbell, E. M., Peterkin, O'Grady, et al., 1997; Domoney et al., 2003a; Pullon, S.R. et al., 1989) , acupuncture (Domoney et al., 2003a; Kuppermann et al., 2007), homeopathy (Domoney et al., 2003a; Singh et al., 1998), yoga/mind body (Pullon, S.R. et al., 1989; Singh et al., 1998) and massage (Campbell, E. M., Peterkin, O'Grady, et al., 1997; Pullon, S.R. et al., 1989) have reported finding them satisfactory as a treatment. The association between CAM practitioner visits in our study provides some of the only data available with regard to PMS sufferers. A review of evidence for CAM and PMS highlighted at least a 50% improvement in symptoms from studies of women using either acupuncture or herbal medicine (both Western and Chinese) (Jang et al., 2014). This is in contrast to our data which found no association between more frequent levels of PMS and visits to an acupuncturist or use of Chinese medicines and this may reflect the

cultural differences in behaviour of Australian women with less exposure and knowledge of traditional Chinese medicine than women in cultures where it is more main stream. Systematic reviews of PMS treatment have indicated CAM that may be useful includes massage therapy, reflexology, calcium, vitamin B_6 (Girman et al., 2003; Jarvis, C. I. et al., 2008) and possibly magnesium and yoga (Girman et al., 2003). Our data indicates that women with PMS are indeed adopting these CAM.

Irregular and heavy periods and CAM use has not been well investigated, although there are qualitative studies showing that either type of irregular bleeding has been given as a reason for seeking out CAM (Chapple, 1999; Kuppermann et al., 2007; Sharma, A. et al., 2008). However, analysis of specific CAM use is scant, with use of these modalities being based on tradition or anecdotal evidence. Those women in our study were no more likely to use any CAM practitioner or CAM practice/product compared to non-sufferers. However, women with heavy periods demonstrated a decreased likelihood of visiting a massage therapist or using yoga/meditation. Menorrhagia is likely to limit women's daily activities due to discomfort and embarrassment and therefore these results are not unexpected (Karlsson et al., 2014).

Women with severe period pain in this cohort used limited CAM, being more likely to have used aromatherapy oils when dysmenorrhoea occurred with any sort of frequency and herbal medicines if the pain occurred often. There are a number of surveys into women's choice of treatment for dysmenorrhoea and they have reported that over 50% of women surveyed were satisfied with herbal medicine (Cheng & Lin, 2011; Chia, Lai, Cheung, Kwong, Lau, & Leung, 2013; Kuppermann et al., 2007), vitamin/dietary supplements (Chia, Lai, Cheung, Kwong, Lau, & Leung, 2013; Kuppermann et al., 2007) and acupuncture for 'pelvic discomfort'(Kuppermann et al., 2007) however the latter two CAM were not significantly adopted by our cohort. A few recent clinical trials indicated aromatherapy may reduce dysmenorrhoea (Ou et al., 2012; Yoo-Jin Kima et al., 2011) and traditional herbal medicines have established uterine spasmolytic properties and have also been effective in trials in reducing dysmenorrhoea (Heidarifar et al., 2014; Van Andel et al., 2014) lending support to the practice highlighted in our analysis.

For many women, both the regular occurrence of CPPD symptoms and lack of effective treatments offered, may explain sufferers frequent adoption of some CAM. That CAM practitioner visits are much less prevalent than CAM practice/product use leads to the conclusion that self-prescription in this sector is common and raises important issues of efficacy and safety in the absence of professional supervision. In addition, whilst CPPD categories have been largely compartmentalised in the literature, data from this survey indicates a great deal of crossover of CPPD symptoms within this age group. The overall prevalence of CPPD is 56.8% in this cohort emphasising the significance of CPPD as a health issue amongst women aged 34 – 39 years and indeed this level is likely to be understated as only severe levels of dysmenorrhoea were recorded. Results from this analysis of 34-39 year old menstruating women derived from a large nationally representative sample of Australian women contributes important information regarding the prevalence of CPPD symptoms and their relationship to the differential adoption of CAM. The analysis further indicates that women experiencing CPPD symptoms are likely to be using CAM of which the majority involves CAM products and therapies rather than consultations with CAM practitioners.

The limitations of our study are first the retrospective recording of both CAM use and CPPD symptoms which are therefore subject to recall bias. Second, due to the self-perceived nature of the CPPD symptoms examined and the lack of a clear definition to categorise them, subjective reporting makes data comparisons more difficult. The large sample size and otherwise representative nature of this cohort of 34 – 39 year old women, as well as the

specific enquiry into those CAM commonly used in Australia does however provide valuable insights, especially for health providers, into the extent and preferential use of CAM for specific CPPD symptoms.

Conclusion

This analysis has confirmed the high levels of CPPD symptoms and CAM use amongst women in this age group and provides the first detailed insight into the differential adoption of different individual CAM practitioners and practices/products across CPPD symptoms. Whilst women with PMS and severe dysmenorrhoea are using CAM, those with heavy and irregular bleeding may be unaware of existing CAM options. However, more extensive investigation is required to ascertain how effective and safe CAM use is in these circumstances, what is motivating their usage and how well informed all relevant health practitioners, as well as women with CPPD, are regarding the use of appropriate CAM.

Table 1 The association between cyclic perimenstrual pain and discomfort (CPPD) and consultations with complementary and alternative medicine practitioners

Cyclic perimenstrual pain and discomfort symptoms	Chiropractor		Osteopath		Massage Therapist		Acupuncturist		Naturopath/Herbalist		Other CAM Practitioner	
	Yes (n=1,480)	No (n=5,929)	Yes (n= 621)	No (n= 6,781)	Yes (n= 3,152)	No (n= 4,260)	Yes (n= 667)	No (n= 6,733)	Yes (n= 835)	No (n= 6,567)	Yes (n= 568)	No (n= 6,833)
	%	%	%	%	%	%	%	%	%	%	%	%
Endometriosis [C,D,E]												
No	95	96	96	96	95	97	93	97	94	97	95	96
Yes	5	4	4	4	5	3	7	3	6	3	5	4
PMS [C, D, E, F]												
Never	36	38	33	38	34	40	31	38	29	39	29	38
Rarely	22	21	22	21	22	21	21	21	19	21	22	21
Sometimes	29	28	28	28	30	27	31	28	31	28	32	28
Often	13	13	17	13	14	12	17	13	21	12	17	13
Irregular Periods [E]												
Never	62	61	64	61	61	61	58	62	56	62	57	62
Rarely	14	17	16	16	16	17	17	16	17	16	16	16
Sometimes	15	13	12	14	14	13	14	13	16	13	16	13
Often	9	9	8	9	9	9	11	9	11	9	11	9
Heavy Periods [E]												
Never	51	53	54	52	52	53	52	53	46	53	49	53
Rarely	19	17	16	18	18	17	17	18	18	18	20	17
Sometimes	18	19	19	19	19	18	19	18	21	18	17	19
Often	12	11	11	11	11	12	12	11	15	11	14	11
Painful Periods [D,E]												
Never	53	53	52	53	51	54	48	54	48	54	48	53
Rarely	24	22	22	23	24	22	23	22	24	23	24	23
Sometimes	15	17	17	16	17	16	18	16	15	16	18	16
Often	8	8	9	8	8	8	11	8	13	7	10	8

[A] statistically significant association with chiropractor
[B] statistically significant association with osteopath
[C] statistically significant association with massage therapist
[D] statistically significant association with acupuncturist
[E] statistically significant association with naturopath/herbalist
[F] statistically significant association with 'other CAM' practitioner

Table 2. The association between cyclic perimenstrual pain and discomfort (CPPD) and use of complementary and alternative medicine practices and products

Cyclic perimenstrual pain and discomfort symptoms	Vitamins/Minerals		Yoga/Meditation		Herbal medicines		Aromatherapy oils		Chinese medicines		Other alternative therapies	
	Never or Rarely (n=2,377)	Sometimes or often (n=5,043)	Never or Rarely (n=5,705)	Sometimes or often (n=1,714)	Never or Rarely (n=5,917)	Sometimes or often (n=1,500)	Never or Rarely (n=6,212)	Sometimes or often (n=1,203)	Never or Rarely (n=7,016)	Sometimes or often (n=403)	Never or Rarely (n=6,659)	Sometimes or often (n=741)
	%	%	%	%	%	%	%	%	%	%	%	%
Endometriosis [A,B,C,E,F]												
No	98	96	97	94	97	95	96	96	97	92	97	94
Yes	2	4	3	6	3	5	4	4	3	8	3	6
PMS [A,B,C,D,E,F]												
Never	41	36	39	32	40	29	39	29	38	31	38	28
Rarely	22	20	21	20	21	20	21	20	21	20	22	18
Sometimes	26	30	28.	31	27	33	28	33	28	31	28	34
Often	11	14	12	17	12	18	12	18	13	18	12	20
Irregular Periods [A,C,E,F]												
Never	64	60	61	60	62	57	62	58	62	55	62	56
Rarely	16	17	17	16	16	17	16	18	16	16	16	16
Sometimes	12	14	13	15	13	16	13	14	13	17	13	16
Often	8	9	9	9	9	10	9	10	9	12	9	12
Heavy Periods [C,D,F]												
Never	55	51	53	51	54	47	54	47	53	49	54	45
Rarely	17	18	17	18	17	18	17	18	17	17	17	19
Sometimes	17	19	18	19	18	20	18	21	19	18	18	20
Often	11	12	12	12	11	15	11	14	11	16	11	16
Painful Periods [A,B,C,D,E,F]	55	52	54	50	55	45	55	45	53	46	54	43
Never	23	22	23	23	22	24	23	22	23	23	23	24
Rarely	15	17	16	17	16	19	15	21	16	17	16	19
Sometimes	7	9	7	10	7	12	7	12	8	14	7	14
Often												

[A] statistically significant association with vitamins/minerals
[B] statistically significant association with yoga or meditation
[C] statistically significant association with herbal medicines
[D] statistically significant association with aromatherapy oils
[E] statistically significant association Chinese medicines
[F] statistically significant association with 'other alternative therapies'

Table 3 The odds ratio for association of cyclic perimenstrual pain and discomfort and consultations with complementary and alternative medicine practitioners

Cyclic Perimenstrual Pain and Discomfort Symptom	Chiropractor (n=7005)	Osteopath (n=6997)	assage Therapist (n=7008)	Acupuncturist (n=6999)	Naturopath/Herbalist (n=6999)	Other CAM Practitioner (n=6996)
	O/R (C.I.)	O/R (C.I.)	O/R (C.I.)	O/R (C.I.)	O/R (C.I.)	O/R (C.I.)
Endometriosis[C,D]						
No	1.00	1.00	1.00	1.00	1.00	1.00
Yes	1.30 (0.96-1.76)	1.11 (0.71-1.73)	1.48 (1.14-1.92)	1.79 (1.26-2.56)	1.32 (0.92-1.89)	1.21 (0.78-1.88)
PMS						
Never	1.00	1.00	1.00	1.00	1.00	1.00
Rarely	1.15 (0.97-1.37)	1.27 (0.99-1.62)	1.20 (1.05-1.38)	1.23 (0.96-1.58)	1.24 (0.99-1.57)	1.40 (1.08-1.83)
Sometimes[C,E]	1.12 (0.94-1.33)	1.26 (0.98-1.61)	1.29 (1.12-1.48)	1.32 (1.04-1.68)	1.48 (1.19-1.85)	1.45 (1.12-1.89)
Often[B,C,E,F]	1.06 (0.85-1.33)	1.64 (1.19-2.20)	1.47 (1.23-1.76)	1.47 (1.09-1.98)	2.12 (1.62-2.76)	1.66 (1.20-2.29)
Irregular Periods						
Never	1.00	1.00	1.00	1.00	1.00	1.00
Rarely	0.80 (0.67-0.97)	0.93 (0.72-1.20)	0.86 (0.74-0.99)	1.08 (0.84-1.38)	1.02 (0.82-1.28)	0.88 (0.67-1.16)
Sometimes	1.08 (0.90-1.30)	0.82 (0.61-1.09)	1.13 (0.97-1.32)	1.01 (0.77-1.32)	1.20 (0.95-1.51)	1.14 (0.87-1.50)
Often	0.91 (0.72-1.14)	0.89 (0.64-1.24)	1.00 (0.83-1.20)	1.15 (0.85-1.56)	1.15 (0.88-1.52)	1.07 (0.77-1.48)
Heavy Periods						
Never	1.00	1.00	1.00	1.00	1.00	1.00
Rarely	1.21 (1.00-1.46)	0.78 (0.59-1.03)	0.96 (0.83-1.12)	0.81 (0.62-1.06)	1.06 (0.83-1.35)	1.03 (0.78-1.36)
Sometimes	0.99 (0.81-1.22)	0.78 (0.58-1.03)	0.84 (0.71-0.99)	0.77 (0.58-1.01)	1.11 (0.86-1.42)	0.77 (0.57-1.05)
Often[C]	1.13 (0.87-1.47)	0.58 (0.40-0.86)	0.70 (0.56-0.87)	0.60 (0.42-.087)	0.97 (0.70-1.34)	0.89 (0.60-1.30)
Painful Periods						
Never	1.00	1.00	1.00	1.00	1.00	1.00
Rarely	0.96 (0.81-1.15)	1.11 (0.86-1.43)	1.16 (1.01-1.34)	1.15 (0.90-1.47)	0.94 (0.75-1.18)	1.04 (0.80-1.36)
Sometimes	0 .86 (0.69-1.06)	1.25 (0.92-1.69)	1.06 (0.89-1.27)	1.20 (0.89-1.60)	0.69 (0.52-0.90)	1.05 (0.77-1.44)
Often	0 .96 (0.71-1.29)	1.48 (0.98-2.23)	1.14 (0.89-1.46)	1.70 (1.16-2.51)	1.11 (0.78-1.57)	1.09 (0.71-1.68)

[A] statistically significant association with chiropractor
[B] statistically significant association with osteopath
[C] statistically significant association with massage therapist
[D] statistically significant association with acupuncturist
[E] statistically significant association with naturopath/herbalist
[F] statistically significant association with 'other CAM' practitioner

Adjusted for confounding variables - marital status, area of residence, educational status, low iron, depression and anxiety disorder.

Table 4 The odds ratio for association between cyclic perimenstrual pain and discomfort and use of complementary and alternative medicine practices and products

Cyclic Perimenstrual Pain and Discomfort Symptom	Vitamins/minerals (n=7017)	Yoga/meditation (n=7014)	Herbal medicines (n=7013)	Aromatherapy (n=7012)	Chinese medicines (n=7015)	Other alternative therapies (n=6996)
	O/R (C.I.)	**O/R (C.I.)**	**O/R (C.I.)**	**O/R (C.I.)**	**O/R (C.I.)**	**O/R (C.I.)**
Endometriosis[A,B,E]						
No	1.00	1.00	1.00	1.00	1.00	1.00
Yes	1.72 (1.24-2.38)	1.80 (1.37-2.38)	1.34 (1.00-1.79)	0.86 (0.61-1.22)	1.86 (1.22-2.83)	1.28 (0.88-1.85)
PMS						
Never	1.00	1.00	1.00	1.00	1.00	1.00
Rarely[C]	1.08 (0.93-1.25)	1.20 (1.01-1.41)	1.31 (1.09-1.56)	1.27 (1.04-1.54)	1.15 (0.84-1.57)	1.14 (0.89-1.46)
Sometimes[A,B,C,D,F]	1.31 (1.13-1.52)	1.34 (1.14-1.59)	1.49 (1.25-1.77)	1.49 (1.23-1.80)	1.24 (0.91-1.68)	1.46 (1.16-1.84)
Often[A,B,C,D,F]	1.47 (1.21-1.80)	1.64 (1.33-2.02)	1.72 (1.39-2.14)	1.53 (1.21-1.94)	1.38 (0.95-2.01)	1.69 (1.27-2.23)
Irregular Periods						
Never	1.00	1.00	1.00	1.00	1.00	1.00
Rarely	1.16 (0.99-1.36)	0.94 (0.79-1.12)	0.97 (0.81-1.16)	1.02 (0.84-1.23)	1.06 (0.77-1.46)	0.89 (0.70-1.13)
Sometimes	1.21 (1.02-1.44)	1.10 (0.92-1.32)	1.15 (0.96-1.38)	0.96 (0.78-1.18)	1.43 (1.04-1.96)	1.11 (0.87-1.41)
Often	1.13 (0.93-1.38)	0.96 (0.77-1.20)	1.00 (0.80-1.24)	0.91 (0.72-1.17)	1.34 (0.93-1.94)	1.09 (0.82-1.45)
Heavy Periods						
Never	1.00	1.00	1.00	1.00	1.00	1.00
Rarely	1.04 (0.89-1.23)	0.97 (0.81-1.16)	0.92 (0.76-1.12)	0.92 (0.75-1.14)	0.83 (0.59-1.16)	1.04 (0.81-1.35)
Sometimes	0.97 (0.82-1.16)	0.90 (0.74-1.09)	0.93 (0.76-1.13)	0.94 (0.76-1.16)	0.65 (0.46-0.94)	0.89 (0.69-1.16)
Often[B]	0.78 (0.62-0.98)	0.68 (0.53-0.88)	0.92 (0.72-1.19)	0.82 (0.62-1.08)	0.72 (0.46-1.11)	0.85 (0.61-1.19)
Painful Periods						
Never	1.00	1.00	1.00	1.00	1.00	1.00
Rarely	0.85 (0.73-0.98)	1.01 (0.86-1.20)	1.10 (0.92-1.31)	1.04 (0.86-1.27)	1.18 (0.87-1.62)	1.16 (0.91-1.47)
Sometimes[D]	0.94 (0.78-1.13)	1.04 (0.85-1.28)	1.17 (0.95-1.44)	1.46 (1.17-1.82)	1.21 (0.83-1.76)	1.21 (0.92-1.60)
Often[C,D,F]	1.15 (0.88-1.50)	1.31 (0.99-1.73)	1.63 (1.24-2.15)	1.76 (1.30-2.38)	1.79 (1.11-2.87)	1.73 (1.21-2.47)

[A] statistically significant association with vitamins/minerals
[B]statistically significant association with yoga or meditation
[C]statistically significant association with herbal medicines
[D] statistically significant association with aromatherapy oils
[E] statistically significant association Chinese medicines
[F] statistically significant association with 'other alternative therapies'

Adjusted for confounding variables - marital status, area of residence, educational status, low iron, depression and anxiety disorder

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Appendix 4

Cyclic perimenstrual pain and discomfort and Australian women's associated use of complementary and alternative medicine: a longitudinal study.

Abstract

Objective

To examine the longitudinal change in Australian women's prevalence of cyclic perimenstrual pain and discomfort and the association between their symptoms and use of complementary and alternative medicine (CAM).

Method

Data on endometriosis, premenstrual syndrome (PMS), irregular periods, heavy periods and severe period pain were collected over a seven-year period from the Australian Longitudinal Study on Women's Health, for women aged 28 to 33 years in 2006, and at three year follow-ups. Changes in symptoms and patterns of CAM practitioner and therapy/product use associated with these symptoms were analysed using longitudinal regression modelling.

Results

Over the seven-year period, prevalence rates of PMS and heavy periods increased, whilst prevalence rates of endometriosis, irregular periods, and severe period pain remained stable. The most common use of CAM longitudinally associated with the perimenstrual symptoms were use of vitamins/minerals, yoga/meditation, massage therapy, herbal medicine and aromatherapy.

Excluding consultation with a naturopath/herbalist, over the 7-year survey women's use of all other CAM practitioners increased as did their use of vitamin/minerals, yoga/meditation and Chinese medicines, whilst aromatherapy use declined.

Conclusion

Only the prevalence of PMS and heavy periods increased with aging in this sample of women. Whilst overall use of CAM practitioner and self-prescribed products/therapies increased over time, CAM was chosen by women mainly to treat endometriosis and PMS. The extent to which this use reflects treatment efficacy is uncertain.

Keywords: endometriosis**,** premenstrual syndrome, irregular periods, heavy periods, severe dysmenorrhoea, complementary and alternative medicine, longitudinal study.

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Appendix 5

Western herbal medicine consultations for common menstrual problems; practitioner experiences and perceptions of treatment

Fisher C, Adams J, Frawley J, Hickman L, Sibbritt D.

ABSTRACT:

Objective: To explore the prevalence with which Australian Western herbalists treat menstrual problems and their related treatment, experiences, perceptions and inter-referral practices with other health practitioners.

Methods: Members of the Practitioner Research and Collaboration Initiative (PRACI) practice-based research network identifying as Western Herbalists (WHs) completed a specifically developed, on-line questionnaire.

Results: WHs regularly treat menstrual problems, perceiving high, though differential, levels of effectiveness. For menstrual problems WHs predominantly prescribe individualised formulas including core herbs, like *Vitex agnus-castus*, and problem-specific herbs. Estimated clients' weekly cost (median= $25.00) and treatment duration (median= 4-6 months) covering this Western herbal medicine (WHM) treatment appears relatively low. Urban-based women are more likely than those rurally-based to have used conventional treatment for their menstrual problems before consulting WHs (p=0.001). Only 19% of WHs indicated direct contact by conventional medical practitioners regarding treatment of clients' menstrual problems despite 42% indicating clients' conventional practitioners recommended consultation with WH.

Conclusion: WHM may be a substantially prevalent, cost-effective treatment option amongst women with menstrual problems. A detailed examination of the behaviour of women with menstrual problems who seek and use WHM warrants attention to ensure this health care option is safe, effective and appropriately co-ordinated within women's wider health care use.

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Appendix 6

Ethics Approval for Survey of Western Herbalists

From: Research.Ethics@uts.edu.au <Research.Ethics@uts.edu.au>
To: David Sibbritt; Carole Yvonne Fisher; Research Ethics

Dear Applicant

Thank you for your response to the Committee's comments for your project titled, "Survey of naturopathic and medical herbalist experiences regarding the treatment of perimenstrual problems". Your response satisfactorily addresses the concerns and questions raised by the Committee who agreed that the application now meets the requirements of the NHMRC National Statement on Ethical Conduct in Human Research (2007). I am pleased to inform you that ethics approval is now granted.

Your approval number is UTS HREC REF NO. ETH16-0534.

Approval will be for a period of five (5) years from the date of this correspondence subject to the provision of annual reports.

Your approval number must be included in all participant material and advertisements. Any advertisements on the UTS Staff Connect without an approval number will be removed.

Please note that the ethical conduct of research is an on-going process. The National Statement on Ethical Conduct in Research Involving Humans requires us to obtain a report about the progress of the research, and in particular about any changes to the research which may have ethical implications. This report form must be completed at least annually from the date of approval, and at the end of the project (if it takes more than a year). The Ethics Secretariat will contact you when it is time to complete your first report.

I also refer you to the AVCC guidelines relating to the storage of data, which require that data be kept for a minimum of 5 years after publication of research. However, in NSW, longer retention requirements are required for research on human subjects with potential long-term effects, research with long-term environmental effects, or research considered of national or international significance, importance, or controversy. If the data from this research project falls into one of these categories, contact University Records for advice on long-term retention.

You should consider this your official letter of approval. If you require a hardcopy please contact Research.Ethics@uts.edu.au.

To access this application, please follow the URLs below:
* if accessing within the UTS network: https://rm.uts.edu.au
* if accessing outside of UTS network: https://remote.uts.edu.au , and click on "RM6 – Research Master Enterprise" after logging in.

We value your feedback on the online ethics process. If you would like to provide feedback please go to:http://surveys.uts.edu.au/surveys/onlineethics/index.cfm

If you have any queries about your ethics approval, or require any amendments to your research in the future, please do not hesitate to contact Research.Ethics@uts.edu.au.

Yours sincerely,

Professor Marion Haas
Chairperson
UTS Human Research Ethics Committee
C/- Research & Innovation Office

Appendix 7

Is there a role for Western herbal medicine in treating cyclic perimenstrual pain and discomfort?

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Keywords
Cyclic perimenstrual pain and discomfort, dysmenorrhea, Herbal medicine, irregular periods, premenstrual syndrome, *Vitex agnus-castus*

Abstract
Conventional treatments for cyclic perimenstrual pain and discomfort whilst numerous and diverse, have drawbacks including side effects, interference with women's reproductive function and, importantly, failure to address symptoms. Many women turn to herbal medicine to treat the myriad menstrual symptoms. Clinical evidence supports the efficacy of *Vitex agnus-castus* but other medicinal herbs typically used by Western herbalists for treating menstrual symptoms are unsupported by clinical trials. This raises concerns around the efficacy and safety of these herbs. Women's treatment options need to be extended and individualised, where current conventional strategies fail, requiring appropriate clinical trials of potentially useful herbal medicines.

Abstract
Conventional treatments for cyclic perimenstrual pain and discomfort whilst numerous and diverse, have drawbacks including side effects, interference with women's reproductive function and, importantly, failure to address symptoms. Many women turn to herbal medicine to treat the myriad menstrual symptoms. Clinical evidence supports the efficacy of *Vitex agnus-castus* but other medicinal herbs typically used by Western herbalists for treating menstrual symptoms are unsupported by clinical trials. This raises concerns around the efficacy and safety of these herbs. Women's treatment options need to be extended and individualised, where current conventional strategies fail, requiring appropriate clinical trials of potentially useful herbal medicines.

Is there a role for Western herbal medicine in treating cyclic perimenstrual pain and discomfort?

Conventional treatments for cyclic perimenstrual pain and discomfort (CPPD) are diverse and numerous [1]. Many of these treatments have drawbacks including significant costs to users and the health system, some unacceptable side effects [1], interference with women's reproductive function and, importantly, for up to 40% of sufferers a failure to address their symptoms [1]. In response, many women have opted to use complementary and alternative medicine (CAM) - a range of diverse health-related practices and products located predominantly outside the conventional medical curriculum and profession [2] - to treat CPPD symptoms [2-4]. In particular, women who experienced endometriosis and/or frequent premenstrual syndrome (PMS), irregular periods or dysmenorrhea were significantly more likely to consult a naturopath/herbalist than women who did not suffer from these menstrual issues [2].

Reliable, robust, scientific evidence regarding the efficacy and safety of different CAM for treating CPPD is required to convince stakeholders, including conventional medical practitioners, that such treatments are viable, effective and safe. Such evidence is also important to health policymakers' efforts to fund the efficient integration of proven CAM thereby extending CPPD treatment options available to women.

While many Western herbalists (WHs) prescribe medicinal herb combinations tailored to women's needs, *Vitex agnus-castus* (chaste tree), *Paeonia lactiflora* (white peony), *Angelica sinensis* (Dong quai) and *Actaea racemosa* (black cohosh) are core herbs favoured for treating all four CPPD symptoms. WHs perceive there to be a high level of efficacy for herbal medicine in treating dysmenorrhea, PMS, heavy and irregular periods, with low levels of adverse effects and a potentially positive cost to benefit ratio [5].

So the questions addressed here are two-fold - is herbal medicine a viable CPPD treatment option? And how well supported are the efficacy and safety of different medicinal herbs in treating CPPD?

***Vitex agnus-castus* (VAC)**

VAC is one of the most investigated medicinal herbs for the treatment of CPPD symptoms. Since 2001, seven published systematic reviews have reported that : VAC reduced premenstrual dysphoric disorder (PMDD) symptoms by more than 50% after 2 months, an effect equal to selective serotonin reuptake inhibitors [6]; VAC was equal to or better than vitamin B6 in treating PMS, with both providing around 48% improvement [6]; and efficacy rates for VAC were between 52% to 85% compared to those for placebo which were between 24% to 56%, after 3 cycles of treatment [6] with improvement in both physical and psychological domains in PMS and PMDD [6]. Use of oral contraceptive pills did not appear to affect the results achieved with VAC [6] and clinical trials of VAC treatment in dysmenorrhea, have found it to be as effective as oral contraceptives [7] and mefenamic acid in menstrual pain reduction [8]. In

treating cyclical mastalgia VAC reduced breast discomfort by between 45% to 85% within three months of treatment [9].

According to a systematic review of the adverse events (AEs) associated with VAC, these were assessed as mild, reversible and equivalent to placebo. AEs with the highest incidence, reported by 2-5% of 9335 users, were nausea, gastro-intestinal disturbances, headache and acne [10]. Apart from a single serious AE of peripheral ischemia, deemed as a 'probable' result of VAC, its use is considered to be without serious risks [6, 10]. There is a theoretical possibility that VAC could interact with drugs that modulate dopamine and pituitary-based hormone therapies although no such interactions have yet been reported [10]. Although VAC was found to have no effect on the composition of breast milk its safety during pregnancy and lactation has not been established [10].

Angelica sinensis, Paeonia lactiflora and *Actaea racemosa*

For *Angelica sinensis, Paeonia lactiflora* and *Actaea racemosa*, there are no available clinical trials corroborating their efficacy in treating CPPD. Scientific evidence of their potential benefits for CPPD relies on pre-clinical studies of pharmacological activity in what is a complicated, incompletely understood and multifactorial etiology [1].

What we do know from pre-clinical data for *Angelica,* that may be relevant to CPPD treatment, includes a potential: for anti-inflammatory activity [11]; for reducing stress/depression via a brain neurotrophic factor [12]; for normalising blood cell profiles [11]; as a progesterone antagonist reducing heavy bleeding [13] and to alter mood and relax muscles through GABAminergic [14] and serotonergic receptor sites [15]. Putative phyto-estrogenic activity may also mimic reproductive hormone therapy [13]. However, *Angelica*'s anticoagulant properties contra-indicates its use in heavy periods [11]. As for *Paeonia*, it has been shown to have potential anti-depressant activity, raising serotonin and dopamine levels, through inhibition of monoamine oxidase activity [16] and it may also relieve dysmenorrhea through analgesic [17] and anti-inflammatory [17] properties, inhibiting both leukotriene B4 and prostaglandin E2 production [17].

Although traditionally used in treating menstrual dysfunction [18] no trials have assessed *Actaea*'s effectiveness in alleviating menstrual problems. *Actaea* lacks hormonal activity [18], but pre-clinical studies indicate it is anti-inflammatory [19], analgesic [19] and has GABA-A [20] binding properties, possibly therefore relieving dysmenorrhea. *Actaea* also interacts at serotenergic [18], dopaminergic [18] and opioid [18] receptor sites potentially influencing mood-related PMS issues. Additionally, *Actaea* may alter reproductive hormone levels through pituitary function [18] and reduce excessive bleeding by inhibiting plasminogen activation [21]. So whilst preclinical data indicate *Actaea* has the potential to benefit CPPD, credible evidence of its clinical efficacy is lacking.

So is Western herbal medicine an option for CPPD?

Currently, evidence suggests a minimum efficacy of 50% and a good safety profile for VAC as a treatment option for CPPD, particularly PMS/PMDD. However, the other commonly used medicinal herbs at present have little scientific validation of their efficacy via clinical trials although none of them have been associated with serious AE concerns, when properly sourced [22].

There remains little objective, scientific support for three of the four core medicinal herbs used by WHs for CPPD patients. This does not necessarily preclude them from having a valuable place in the treatment of CPPD. Lack of financial incentives hamper more extensive research of medicinal herbs through RCTs that could verify their efficacy in CPPD treatment, but in an environment demanding greater scientific corroboration of CAM, anecdotal evidence and

traditional credentials alone are insufficient to encourage its acceptance. Conventional health providers and policymakers will inevitably remain sceptical and wary of adopting Western herbal medicine without more compelling scientific evidence.

Seeking out additional treatments are none-the-less desirable given the current failure of conventional therapies to effectively treat CPPD. Currently, conventional health practitioners and academics in the field of gynecology have urged the need for treatments to be individualised, possibly requiring concurrent use of several treatment approaches [5]. Inherent in WHs' practice is the blending of medicinal herbs, tailored to address the individual woman's symptoms, much in line with the recommendation for individualising treatment. While credible, high quality, clinical studies of medicinal herbs and the practice of WHs are needed, a realistic paradigm by which to assess their efficacy in treating women with CPPD is also required, one that fulfills the broader need for using individualised therapy in CPPD patient care.

Women are using Western herbal medicines and consulting with WHs to treat CPPD, irrespective of the paucity of robust clinical trials to support much of this practice. This raises concerns around efficacy and safety that need to be addressed with rigorous scientific investigation. Meanwhile, there is a need for additional options to improve the current treatment of CPPD, for which WHs and herbal medicines, may offer real benefits to women, policymakers and practitioners, none more so than conventional health providers who require such information and assurance in order to effectively and safely coordinate care for women with CPPD.

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